

LOUDEN BARN PLANS



The Louden Machinery Company
Fairfield, Iowa

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TO MODERNIZE YOUR FARM
LOUDENIZE YOUR BARN

LOUDEN BARN PLANS

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THE LOUDEN MACHINERY COMPANY



FOREWORD

This book is published with the view of aiding the farmer and dairyman in building his barns so they will properly and economically answer the purpose for which they are intended.

Our Architectural Department was established for the purpose of assisting our customers in not only planning barns that will meet all their requirements in the most economical construction, but also to assist them in solving all other problems that come up, such as proper lighting, heating, ventilating, drainage, disposal of manure, and other sanitary and hygienic problems, as well as proper protection against weather exposure and fire risk.

The department is conducted by men of wide experience who are competent to handle all kinds of farm building construction, and they will combine utility and sanitation together with economy and strength. Our landscape architect can so arrange the farm buildings of any large estate that they will harmonize with their surroundings, and be in harmony with one another. Your farm buildings can display individuality and good architectural design, and at the same time be practical, modern and convenient, separately and collectively.

All the plans shown in this book are our own original designs, produced by our Architectural Department. Some of them have been copied from our illustrations and published in other books and periodicals. A complete index will be found on page 112.

These plans represent the practical results from ideas mostly originated by farmers and dairymen, but are worked out in detail by our expert dairy architects to meet the climatic conditions and other requirements of individual cases.

Let Us Help You Plan Your Barn

Whenever you build a barn or any other kind of building, you build for a definite purpose; this definite purpose should be kept in mind from the start to the finish. Whether it be for properly housing and caring for live stock, for the storage of feed and farm implements, for preparing products for market, or for a combination of some of these, no matter what the purpose may be, it should be built with the correct amount of floor space for each purpose, the total of which will determine the size of the building.

This rule seems very, simple, but sometimes becomes very complicated when the question of economical construction is taken into consideration. For example, a barn 40 feet square would have a floor area of 1,600 square feet, and may be of the correct size and meet all the requirements for which it is intended. At the same time it may be found after careful calculation that a building 32x50 feet, which has the same floor area, will also meet the same requirements, and may cost less on account of not requiring so heavy construction for a 32-foot span as would be necessary for a 40-foot span. This is where the practical builder and trained architect, who is thoroughly versed in the requirements of modern farm buildings, can be of great service to the farmer and dairyman.

Write Us About Your Building Problems

Through the large number of inquiries received and designs worked out, this department becomes an exchange of ideas about farm buildings. New ideas about construction and arrangement are received every day, and new plans developed to suit individual needs.

Modern Barn Requirements

Each barn should be an individual study, and its construction, size and arrangement should represent the results of a systematic analysis of the kind of barn needed. It should be of such a size as will comfortably and economically hold the live stock, feed, bedding, and all articles that it is to contain. The construction should be so that it will resist the weather and be permanent. It should be as fire-resisting as the financial investment will admit. It should be free of all unnecessary posts and other structural members that would interfere with the convenient and economical handling of materials, stock, products and by-products.

Make The Cows Comfortable

Cow comfort receives much attention, because practical tests have demonstrated that an improvement giving comfort and making the cows contented is a good investment. Too much thought and study can not be given to the construction, arrangement and equipment of the barn for the comfort and profit of the herd.

Good Ideas From Practical Men

These plans are not submitted to the reader as designs that will be just what he ought to have to obtain the best possible returns from his farm, but they will meet most of the general requirements for various capacities, uses and climates. They are selected from among the last 2,000 plans drawn by our architects.

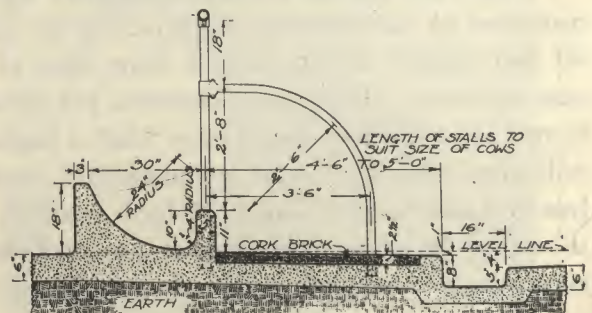
Construction

We will not attempt to go into detail and give the methods of construction best for certain purposes, as this would require more pages than this entire book contains, but we desire to call attention to some facts that may be of general interest.

Concrete and metal are now used where materials are subject to decay from moisture and from weather conditions.

Hollow tile are becoming very popular for walls, because they resist fire and insulate against heat and cold.

Lumber is used for those parts least affected by accumulation of moisture, as it costs less and will serve the purpose.

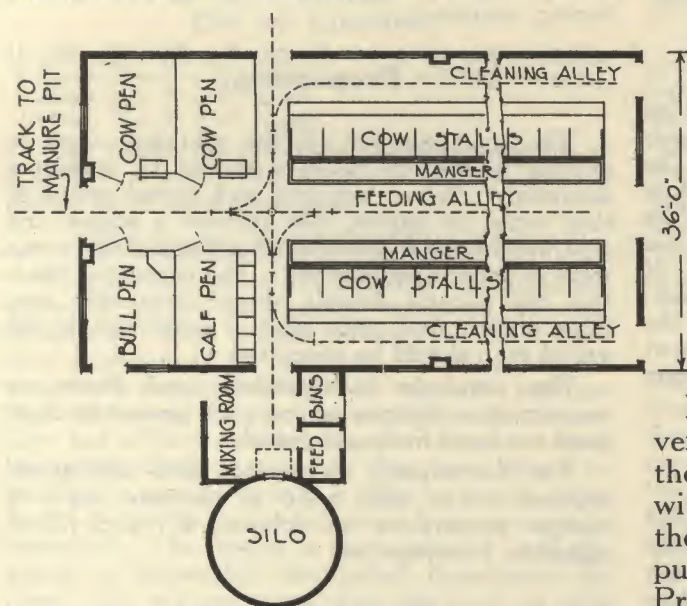


Section of Loudon Cow Stall

Sheet metal, such as corrugated galvanized iron, is much used where light construction and fire resistance from the exterior are desired, and for light roof construction for hay sheds, shelter sheds, implement sheds, etc.

Use Plenty of Windows

Sunshine is the world's best and cheapest disinfectant, and therefore the more windows you place in the walls of the dairy barn the better. It is impossible to get too much light in a barn for any kind of live stock. Some argue that it is hard to keep out flies if the barn is not dark. Put shades on the windows to pull down when the stock is let out, keep the barn clean, and locate the manure pit 100 feet from the barn, and the flies will not bother you. In extremely cold climates it is well to use double glazed sash, or put on extra storm sash in winter.



Typical Plan of Dairy Barn

For the correct amount of window glass surface to use in your barn, see the table on page 25.

The windows should be so constructed that when open the draft will not blow directly on the cows or permit rain, sleet or snow to blow in.

Save Labor

Farmers realize the value of labor-saving devices because of the shortage of help.

Locate the silo where it will be convenient for feeding as well as filling. Locate the feed bins where they can be reached with the least number of steps, and locate the manure pit where you will not have to push the load up hill, if it can be avoided. Properly handle feed and manure by using improved methods and labor-saving appliances, and you will greatly increase the earning capacity of your dairy.

The barn must be convenient for your help, as well as comfortable for your cows. It should be sanitary, and so equipped that no labor is lost in cleaning or feeding. It might be built according to one or a dozen plans, and fitted with this or that ventilating system, but the principles of each are the same and should combine convenience and comfort with sanitation, strength and durability.

Write us for any information you need that is not covered in this book. Any ideas that we have gained through our 53 years of barn specializing experience are yours.

Our Agricultural-Architecture department offers the opportunity for expert and impartial advice and assistance on all important farm and farm building operations.

We can furnish a man of acknowledged ability to visit you and consult with you upon any subject relating to the betterment of the farm, whether your desire is to increase the efficiency of an old farm and its buildings, or to establish a newly acquired estate upon a modern basis.

The choice of a property is often difficult for the inexperienced. An expert opinion on the worth and adaptability of land is a part of our service. The fees for this special service are very reasonable.

AGRICULTURAL-ARCHITECTURE DEPARTMENT,
THE LOUDEN MACHINERY COMPANY.

GENERAL INSTRUCTIONS FOR BARN CONSTRUCTION

— Concrete —

Materials

Concrete is ordinarily composed of cement, sand, gravel or crushed stone and water. The selection of these materials is largely dependent on local conditions, and while no unalterable rule can be laid down in regard to it, certain general conditions may serve as a guide to the inexperienced.

Cement

Portland cement of the best quality should be used. It must be carefully protected when stored. If the cement gets damp it becomes lumpy. The presence of a few lumps in a sack of cement does not spoil the whole sack, but the cement should be screened and the lumps rejected, if they are too hard to crumble between the fingers easily. If the cement is properly stored it will keep indefinitely, but the sacks should never be piled on the ground nor on a damp floor. Unless the cement can be piled on a dry floor a temporary platform should be provided.

Sand, Stone and Gravel

The sand and broken stone or gravel are called the "aggregate." Generally speaking the particles which pass through a sieve having a $\frac{1}{4}$ -inch mesh are considered "sand" while those larger than $\frac{1}{4}$ -inch are called "gravel." A fine material from crushed stone and known as "stone screenings" is sometimes used as a substitute for sand. Theoretically such a material is good, but, as usually obtained, the screenings contain an excessive amount of stone dust which makes the material unsuitable for concrete unless the dust and very fine particles are screened out. Sand and gravel are probably the most popular materials because they are frequently found in nature in a condition practically ready for use and may be secured at little cost.

The sand should be clean. An idea of its cleanliness may be obtained by shaking some of it with water in a glass jar, and if there is a decided muddiness it is evident that the sand is too dirty to use in its original condition. The sand can be cleaned by stirring it in a tank with two or three changes of water, or by spreading it in a thin layer and washing it with a hose. Preference should be given to sand containing a mixture of coarse and fine grains. Extremely fine sand does not make a strong mortar. If it is the only sand at hand, get a coarse material and mix with it.

Either **crushed stone or clean gravel** is suitable for the coarse material. It is chiefly a question of which can be obtained at the least cost. Good concrete cannot be made with flat stones, especially if they are soft and shaly. Neither are long, splintery stones suitable. Stone which disintegrates upon exposure to the weather, or that which has a chalky surface, will not make strong and satisfactory concrete.

Proportions

The quantities of all the materials used in making mortar or concrete should be measured accurately. Never use sand and gravel mixed as they occur in nature, but provide a screen and separate the material into sand and gravel and remix them in definite proportions. The reason for this is that the natural deposit almost invariably contains a great deal more sand in proportion to the gravel than should be permitted.

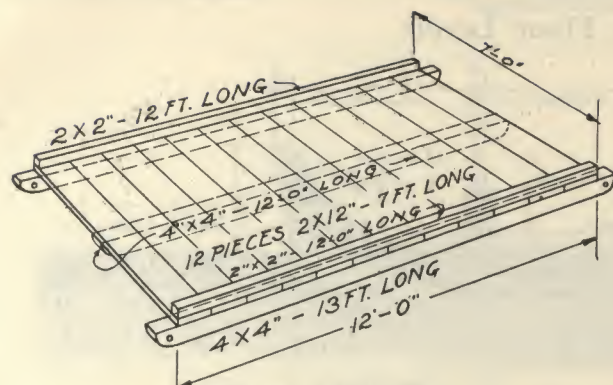
For concrete foundations and floors we recommend a mixture of one part cement to three parts sand and five parts gravel.

For the amount of cement, sand and gravel required for a cubic yard of concrete made of various proportions see columns (1) and (2) of table No. 1 on page ten.

Mixing Concrete

To make good mortar of concrete it is necessary to have every particle of sand covered with cement, and every particle of gravel or crushed stone covered with the cement-sand mortar. The mixing is quite as important as any other part of the process of making the concrete. The equipment for mixing concrete by hand should be a tight platform about 7 ft. x 12 ft., square-pointed shovels, a mortar hoe, steel-body wheelbarrow, sand screen, mortar box, water barrels, buckets, and a measuring box holding four cubic feet.

A well-made mixing platform should be a part of the regular equipment of a farm, and it will be cheaper to build a good one at the outset than to waste time and money in constructing and using temporary ones. Such a platform can be built as follows: using 2-inch lumber, nailed upon three 4 x 4-inch stringers rounded at the ends. The outside stringers project a little at both ends of the platform and are bored for clevis irons, so that the platform may be readily dragged about the farm. To make this platform requires the following:



Bill of Lumber

- 12 pieces 2" x 12" x 7' dressed on one side and two edges.
- 2 pieces 2" x 2" x 12' dressed on one side and two edges.
- 2 pieces 4" x 4" x 13' rough.
- 1 piece 4" x 4" x 12' rough.

The reason for specifying dressed lumber is to provide a smooth and tight platform which will reduce the work of shoveling.

Workmanship and Quality

In preparing to mix a batch of concrete, the materials should be carefully measured and not guessed at. First spread the sand in a thin layer over a portion of the platform. Then empty the cement on top of the sand and mix both together dry, continuing the turning until the color is uniform and without streaks of sand or cement. After the cement-sand mixture has thus been turned at least twice, spread it into a thin layer and dump upon it the gravel which has been previously measured. The mixing is then repeated until the gravel is thoroughly distributed throughout the mass; this will require turning the batch at least three times. Make a trough in the center and pour into it nearly as much water as is required. A medium wet mixture of 1 : 3 : 5 concrete will require for a one-sack batch about seven gallons of water. The whole mass must now be thoroughly mixed, or until every particle of gravel is covered with the cement-sand mortar. When the mixing is completed, the concrete should be left in a long compact pile, so as to protect it from rapidly drying out. Everything should be in readiness so the concrete can be placed with the least possible delay.

The quality of the concrete depends largely upon the amount of water in the mixture, a wet mixture giving better results than a dry one. In fact, a dry mixture is not capable of developing all the strength of the cement. Dry mixtures are frequently used in making cement products, but the practice is a bad one and should be avoided whenever possible.

Foundation Walls

The foundation walls below the ground, the lower story walls from the ground up to the window-

sills, and the ground floor, should be built of concrete.

It would be well to build the entire outside walls of the first story out of concrete, hollow tile or brick, but if this is found to be too expensive the concrete should be run at least 12 inches above the lower floor and 18 inches above the ground, so that all danger from moisture rotting the bottom of the wood construction will be avoided.

A concrete foundation should extend down deep enough to avoid all danger of frost, and down to permanent moisture of the ground in climates where alternate wet and dry seasons occur.

The base or footing should be not less than 2 feet thick, and the wall may taper to a thickness of 1 foot at the surface of the ground.

For frame barns built on level ground the concrete foundation above ground should be 18 inches high, and at least 8 inches thick. If the concrete floor is laid on top of the ground (after sod and loose dirt are removed) its surface should extend about 6 inches above the exterior grade to prevent storm water from running into the barn, and the concrete wall should extend 12 inches above the floor, which will make it about 18 inches above the outside ground surface.

Concrete Floors

The concrete floor in a room which is to contain live stock should never be lower than the ground level at the door where they enter the room, so that it be necessary for the stock to step **down** to the floor in place of **up** to the floor level in entering the barn. Many a good animal has been crippled by stepping down over a door-sill and slipping when her feet struck the smooth floor at a lower elevation.

A concrete approach on the outside of the barn leading from the ground level up to the floor level at each doorway will not only prevent stock from stumbling, but will prevent considerable dirt from being tracked into the barn, and will make trucking or driving into the barn much easier. The surface of approaches should be ribbed.

Cost

The cost of concrete construction in most cases will run from 50 to 65 cents per cubic foot. To give an example of cost of a concrete foundation wall for a frame barn, the foundation wall as shown in the sectional view on page 12 requires a little less than 4 cubic feet of concrete for every foot of its length, and is estimated to cost \$2.00 per running foot. If a mixture that is composed of one part cement, two parts sand and four parts gravel (by volume) is used, it would require $\frac{1}{5}$ barrel of cement, $\frac{1}{17}$ cubic yard of sand, and $\frac{1}{8}$ cubic yard of gravel per running foot.

This estimated price covers the cost of forms and all false work that is required for its installation, and makes the most economical foundation that can be installed.

Locating the Floor Levels

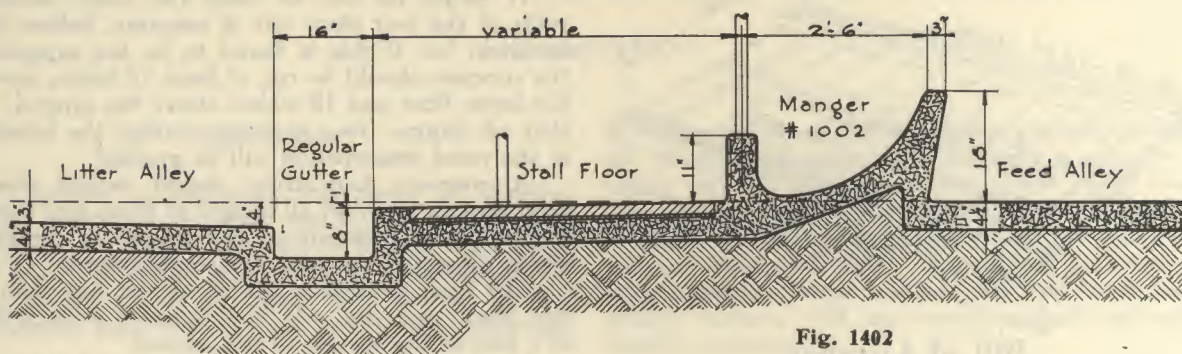


Fig. 1402

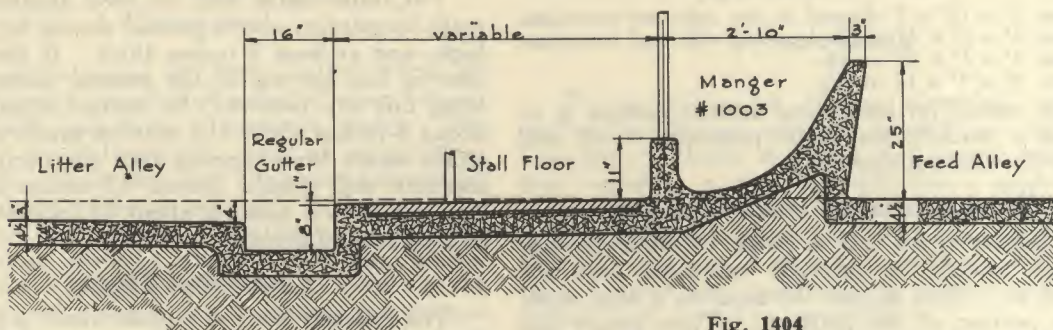


Fig. 1404

Locating the floor levels is one of the most important things in the equipment of a dairy barn. It is important not only in getting the proper drainage of the mangers and gutters, but also in getting the proper grades of the floors to make them correspond with the outside approaches.

Door sills should have a slight drop on the outside to keep rain from beating in, and a short nearly level ramp or approach on the outside should be roughened to prevent slipping, but there should never be a raised sill with smooth slanting floors, like that shown by



Fig. 1079
Poor Construction

Fig. 1079, for the cows to stumble over and to cause them to slip and fall when the floors are wet.

It is desirable to have all the door sills at the same level if possible and this is a convenient level to use as a datum or reference level.

The diagrams, Figs. 1404, 1402 and 1438 are sections of standard cow stalls and represent the three sizes of mangers, namely Nos. 1003, 1002 and 1001.

All the litter alley floors on which the cows travel to and from the stalls are practically on a level with the door sills. They should have a little slope toward the gutter so that water will drain into it, (a slope of one inch is sufficient).

The front of the stall platforms are three inches above the door sill or reference level and the plat-

form slopes one inch toward the gutter for drainage. This slope must not be more than one inch because it is injurious for the cow to stand with the hind feet much lower than the front.

The feed alleys are on a level with the front of the stall platform or three inches above the door sill or reference level. When doors open from the feed alley the floor should be sloped down to the door sill level.

Figure 1403 shows an arrangement for use in very narrow barns. The feed alley floor is raised to the level of the top of the manger and the bottom of the gutter is sloped from the litter alley making what is known as the fadeaway gutter. This arrangement can also be used in connection with the mangers Nos. 1002 and 1003 if desired, the chief objection being that it is necessary to have very steep inclines in the cross alleys connecting the feed and litter alleys and steep inclines should be avoided as much as possible because they are inconvenient and often dangerous.

Getting the Levels.



Fig. 1080

Probably the best way to get the levels is to make stakes, like that shown in Fig. 1080, notched to correspond with the different levels. Drive them into the ground so that all notches come to the proper levels and stretch lines between them, which will be held by

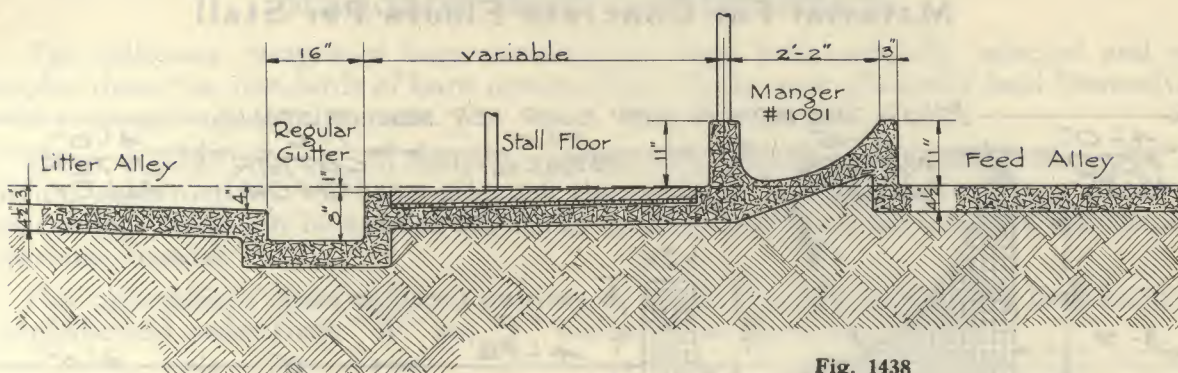


Fig. 1438

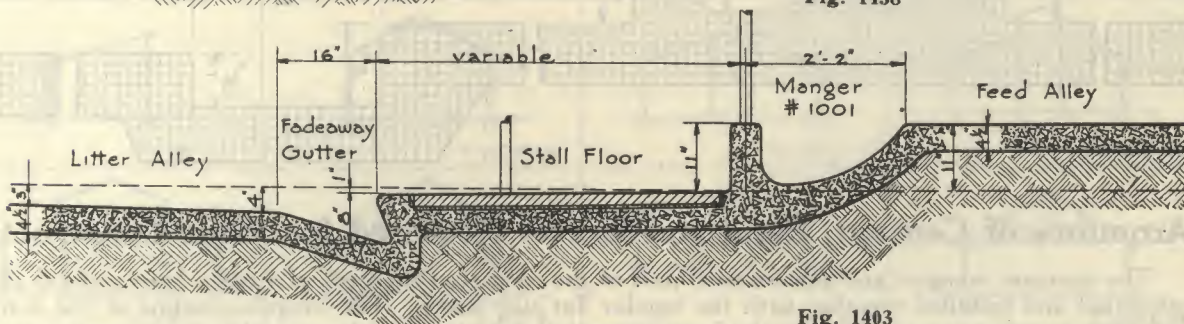


Fig. 1403

the notches, without slipping. Or, the stakes can be driven into the ground and properly notched afterwards. Marks on the walls will also assist in getting the proper levels.

In leveling the ground, allow for the thickness of the concrete. When the floor is to be $4\frac{1}{2}$ inches thick, the average *litter alley ground level* will be $4\frac{1}{2}$ inches below the door sill level. With this as a basis, all other levels can easily be determined by referring to the height measurements in Figs. 1404, 1402, 1438 and 1403. When pens for calves, cows or bulls are to occupy a part of the floor, the litter alley levels will usually be suitable for the pen floors.

It will pay well to make the dirt levels conform as nearly as possible to the finished floor levels—allowing for the depth of the concrete—and in no case should the variations in the dirt grading be so much that the concrete will be 8 or 9 inches thick in some places and only 3 or $3\frac{1}{2}$ inches thick in others. **Be sure to thoroughly tamp all filled dirt before putting in the concrete.**

Drainage Grades. There should be a slope lengthwise in both manger and gutter for flushing out. The drop should range from one to two inches in fifty feet for the mangers. The gutter slope should be about twice as great. One drain should be provided for each 50 feet. This will be sufficient to properly wash out the mangers, flush out the gutters and keep the barn in a good, sanitary condition. The less the incline, consistent with good drainage, the better; and the truer the concrete work, the less the incline required.

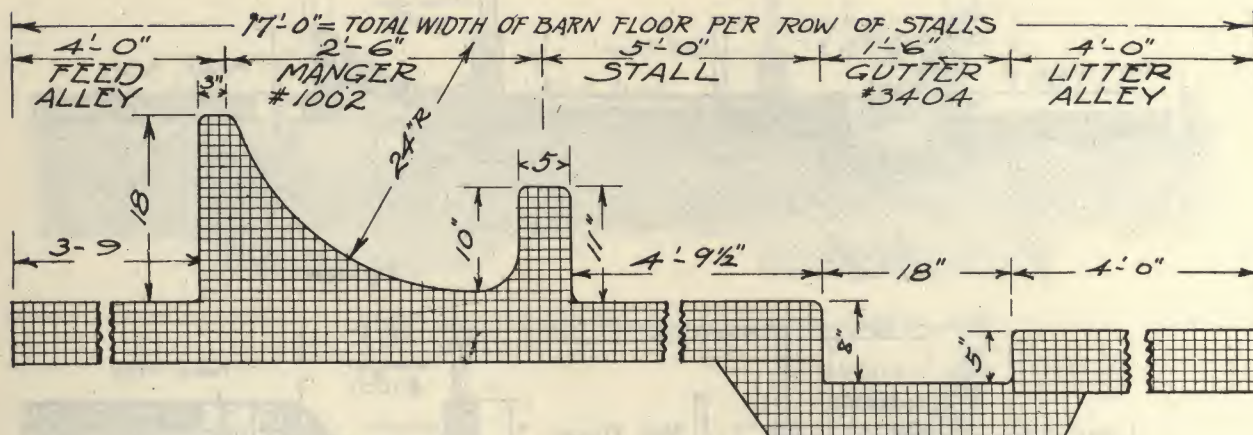
As shown on Figures 1402, 1403, 1404 and 1438,

the dimensions for the mangers and gutters are standard. These standards are the result of years of patient observation and research as to the best possible design and size required. The width of the stall platform depends upon the kind and size of cows varying from 4 feet 4 inches for small Jerseys to 5 feet 4 inches for large Holsteins. Also, the cows in a herd will sometimes vary considerably in size and the cows will look better arranged according to size than if large cows and small cows were to stand side by side. We believe that varying the width of the cow stalls from one end of the stall row to the other will be found more satisfactory than the use of alignment devices. The only way to make the alignment thoroughly effective is by varying the distance from the manger to the gutter and this can best be done as stated above.

The width of the litter and feed alleys can be varied to suit individual requirements. Dairymen should study these measurements carefully before determining the width of the alleys and stall platform, and the kind of manger and gutter to use, taking into consideration the width of the barn, the size of the cows and anything else that may be necessary to arrange the equipment to the best advantage. Our equipment, with the exception of our mangers, may be varied to suit requirements and the different sizes and styles of our mangers, are adapted to any size of cows from the largest to the smallest.

Write for directions for erecting Louden Sanitary Cow Stalls and constructing Louden Standardized Mangers.

Material For Concrete Floors Per Stall



Amounts of Cement, Sand and Gravel Required for Floor Construction

The concrete mangers and gutters form part of the concrete floor work of a dairy barn and are always estimated and installed together with the regular flat slab floors. The irregular outline of the mangers and gutters makes it very hard for the inexperienced to calculate just how much cement, sand and stone is required for the construction, and we have therefore prepared the above cross section.

This section represents a floor 17 feet wide for one row of cow stalls with feed and litter alleys, or just one half of the width of a floor for a barn 36 feet wide, which is the average width of a dairy barn for two rows of cows.

Each of the little squares of this cross section represents a square inch of concrete, and by the table below the floor has been divided into five parts, and the cubical yard contents of each part calculated separately for a panel of floor work 3 feet 6 inches in length, which is the average length required per stall width.

The required amount of material of each kind and for each part of the floor has been calculated separately in fractional numbers.

For concrete work we recommend a mixture of one part cement to three parts sand and five parts gravel as shown in the bottom line of the table below.

The last three columns (8) of this table give the total amount required and show that for each cow stall it will take about $6\frac{1}{4}$ sacks of cement, $7\frac{1}{10}$ cubic yard of sand, and a yard of gravel.

TABLE No. 1

KIND OF CONCRETE						MATERIAL REQUIRED FOR FLOORS 3' 6" WIDE																	
(1) PROPORTION OF MIXTURE			(2) MATERIALS CONTAINED IN ONE CUBIC YARD CONCRETE			(3) FEED ALLEY 4 FT. WIDE CONTAINS .26 CU. YD.			(4) MANGER No. 1002 CONTAINS .41 CU. YD.			(5) STALL FLOOR CONTAINS .324 CU. YD.			(6) GUTTER No. 3404 CONTAINS .098 CU. YD.			(7) LITTER ALLEY 4 FT. WIDE CONTAINS .26 CU. YD.			(8) TOTAL BARN FLOOR PER COW STALL OF 3' 6" WIDTH 1,352 CU. YDS.		
Cement	Sand	Gravel	Sacks Cement	Cu. Yds. Sand	Cu. Yds. Gravel	Sacks Cement	Cu. Yds. Sand	Cu. Yds. Gravel	Sacks Cement	Cu. Yds. Sand	Cu. Yds. Gravel	Sacks Cement	Cu. Yds. Sand	Cu. Yds. Gravel	Sacks Cement	Cu. Yds. Sand	Cu. Yds. Gravel	Sacks Cement	Cu. Yds. Sand	Cu. Yds. Gravel	Sacks Cement	Cu. Yds. Sand	Cu. Yds. Gravel
1	2	3	6.96	.52	.77	1.8	.135	.200	2.85	.213	.315	2.25	.168	.249	.68	.051	.075	1.8	.135	.224	9.4	.703	1.04
1	2	4	6.04	.45	.89	1.7	.117	.231	2.48	.188	.364	1.96	.146	.288	.56	.044	.087	1.7	.117	.231	7.6	.612	1.22
1	3	4	5.2	.58	.77	1.35	.151	.200	2.23	.238	.315	1.68	.188	.249	.51	.056	.075	1.35	.151	.224	7.03	.790	1.04
1	3	5	4.64	.52	.86	1.21	.135	.224	1.90	.213	.353	1.50	.168	.279	.455	.051	.084	1.21	.135	.224	6.27	.702	1.16

The above calculations are based on a floor of 6-inch thickness. This is the thickness we recommend for "made" ground or for any ground subject to unequal settlement. If the floor is to be laid on a natural bed of clay, sand, gravel or hard ground, a cement floor of 4-inch thickness, placed by experienced concrete men, will be sufficient.

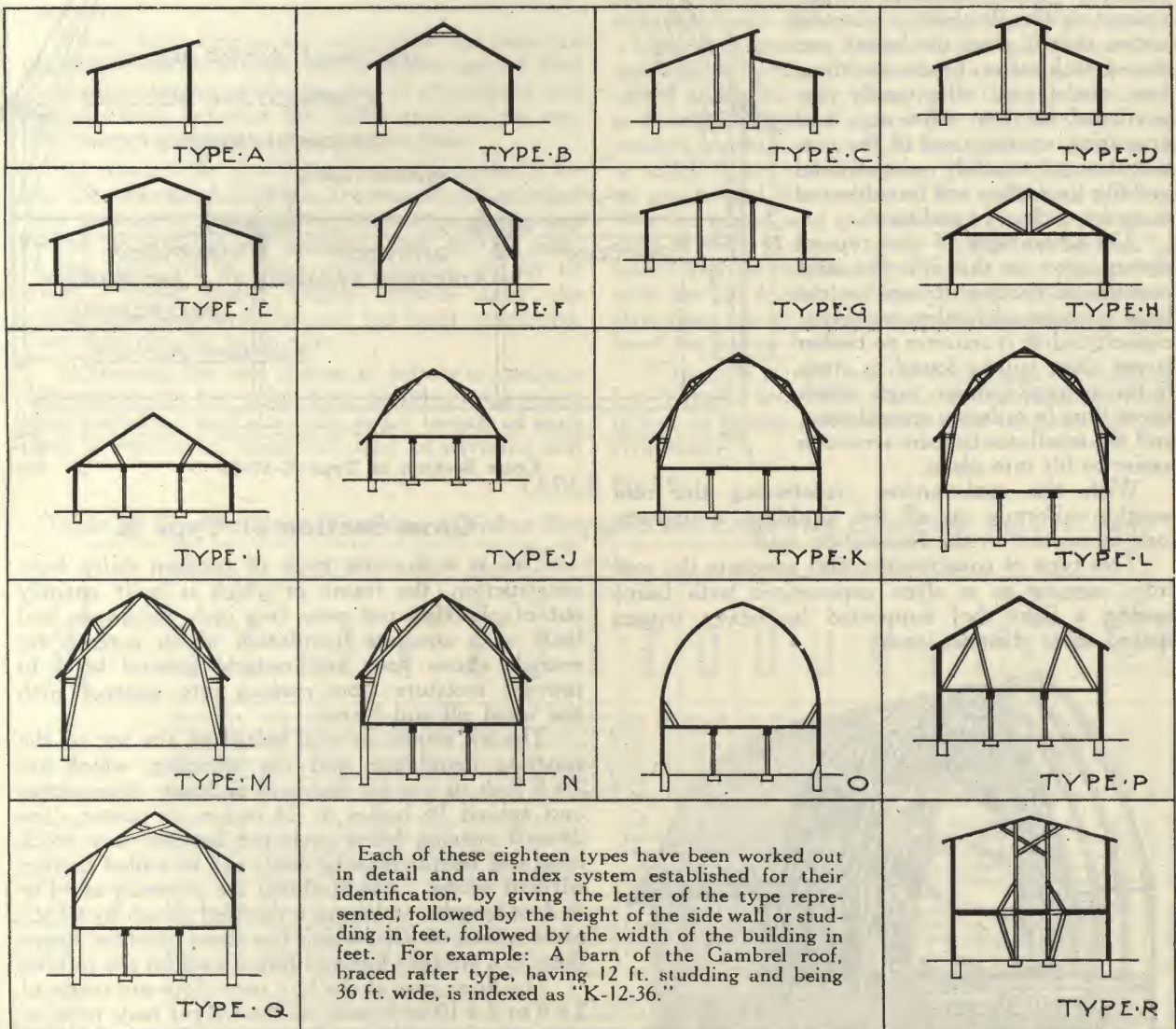
A 4-inch floor would require just two-thirds of the amount of material mentioned in the above table.

Standard Barn Construction

The following designs of barn construction have been carefully selected and we consider them the standards of barn construction which most efficiently lend themselves to the average barn requirements.

From a large number of designs, representing almost every conceivable type of building construction, we have selected the outlines representing eighteen kinds of construction which can be applied efficiently to meet nearly all the needs of the farmers in various climates.

For convenience these eighteen outlines or types of construction have been lettered in alphabetical order from "A" to "R" inclusive, as illustrated below.



These types of construction are particularly well adapted for various farm buildings as follows:—For general purpose or dairy barns, use type J, K, L, N, O, P or Q. For milking barns without hay mow, use type D, G, H or I. For horse barns, use type J, K, O or P. For hog houses, use type A, B, C, D, G or I. For hay sheds, use type B, E, F or M. For implement sheds, use type A, B, G, H or I. For sheep barn, use type B, C, D, E, G, H, I or J. For chicken houses, use type A, B, C, D or G. For cattle feeding barns, use type E, G, K, O or R. (For type R also see page 102.) For garage, use type A, B or H.

Construction Type "K"

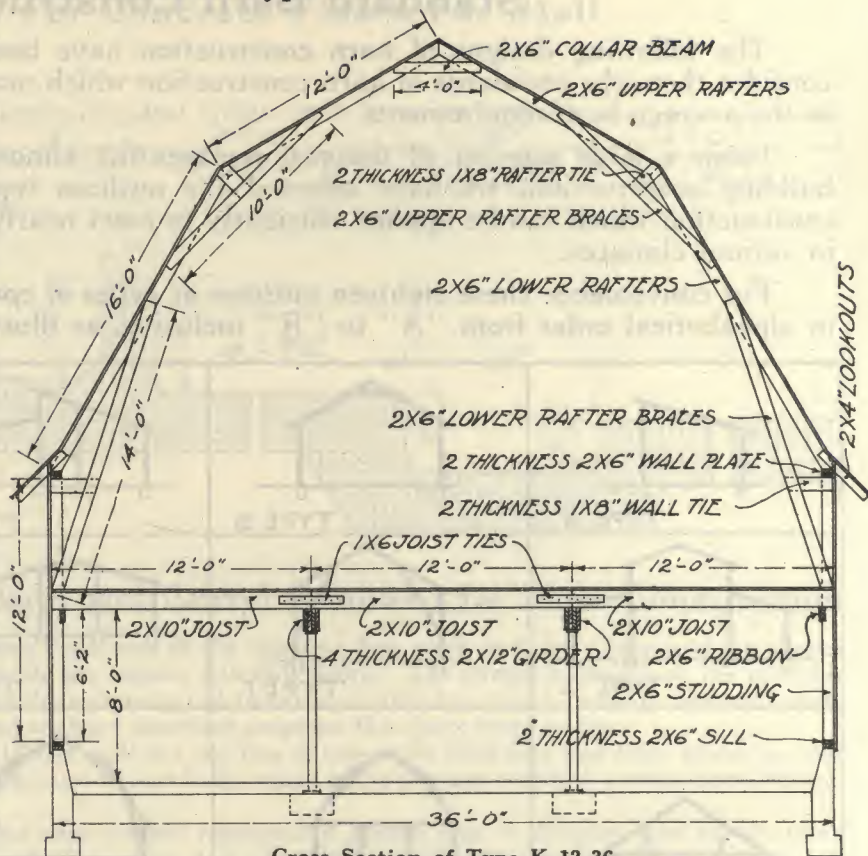
Type "K" refers to the Gambrel roof, braced rafter type of construction which is particularly recommended for general purpose and dairy barns for western states where it is not necessary to drive into the mow floor for threshing or for the storage of grain previous to threshing.

The particular size illustrated by cross section "K-12-36" is for a barn 36 feet wide and sidewalls made of 12-foot studding. Upon examining this illustration you will notice that it gives the length and size of each rafter, brace, studding, joist, girder, etc., all properly proportioned for best efficiency, best appearing contour and of the correct strength to safely resist all dead and live loads they will be subjected to under ordinary conditions.

The advantages of this type of construction are that it is the most economical because it requires the least amount of lumber per given capacity; that it requires no timber larger than will be found in stock in the average lumber yard, which saves time in ordering special sizes, and the small size timbers are much easier to lift into place.

With the roof arches transferring the roof weight uniformly on all the studding, a uniform load is carried on the foundation wall.

This type of construction also prevents the roof from sagging as is often experienced with barns having a light roof supported by heavy trusses spaced some distance apart.



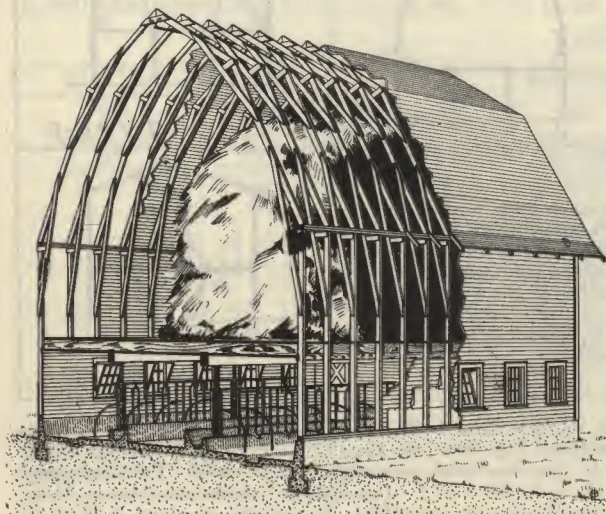
Cross Section of Type K-12-36

Cross Section of Type K

This is a favorite type of modern dairy barn construction, the frame of which is built entirely out of planking not over two inch thickness, and built on a concrete foundation which extends far enough above floor and outside ground level to prevent moisture from coming into contact with the wood sill and frame.

The sill should be well bolted on the top of the concrete foundation and the studding, which are 2 x 6 inch in size for barns of ordinary dimensions, and spaced 16 inches or 24 inches on center, (the 24-inch spacing being preferred because any stock length of boards may be used) can be nailed thereto without waste. The studding are generally of 14 or 16 foot lengths and have a doubled 2-inch by 6-inch plate spiked on top, which ties them together, keeps them in a straight line and forms a sill for the rafters.

The floor joist of the hay mow floor are made of 2 x 8 or 2 x 10 inch joist, as the weight may require, and are spaced the same as the studding so that the end of each joist may be spiked against the side of the studding and at the same time rest on a 2 x 6 inch ledger or "ribbon" which is notched 1 inch into the studding and continues the full length of both



side walls with as few joints as possible. Three lengths of joist are generally required to reach from one side of the barn to the other; the ends of the middle tier of joist are spiked and lapped against the inside ends of the two outer tier of joist so that each set of joist forms a continuous tie from one side wall to the other, to take up the outward thrust of the roof, and the joist are supported under the lapped ends on a set of girders, built up out of three or four thicknesses of 2 x 10 or 2 x 12 inch joist; built up continuously from one end of barn to the other with as few lengths as possible and all end joints broken, so that there will not be more than one end joint at any one place along the length of the barn.

These floor beams are supported by posts or preferably iron columns, which are so spaced that they will intersect with the line of stanchions and the partitions between the stalls, and rest on concrete piers built below the concrete floor.

As this article is written more particularly for the inexperienced builder, it is well to mention that as soon as the studding are set in place, they should be well braced against wind, and as soon as the joist are in place more braces should be added. These braces should remain until the siding is in place and the roof has been completed, then they may be taken out.

In framing the roof one set of rafters is carefully laid out on the hay mow floor or other convenient level platform, and after the exact length of each piece is computed, these are used as patterns and

the required number of pieces cut from this one set of patterns. When all rafters, braces, ties and collar beams have been cut, each set of rafters, braces, ties, etc., is spiked together so as to form a complete arch rib which will reach from the plate of one side wall to that of the other.

The best method of procedure is to build all these arches laid flat, one on top of the other, on the building, the ends of each arch (the heels of lower rafters) resting on the wall plates at the point where it is to be secured after it is raised to a vertical position.

After all of the arches are completed the end arch is hoisted up to a vertical line, perfectly plumbed, well spiked into place, and well braced, a block and rope are hooked to the collar beam (the top horizontal beam to which hay track is fastened) of the arch that is in place, with this the next arch is hoisted, plumbed and nailed in place and this method is continued until all are in place. Each arch is nailed to several sheathing boards that are used as guides and ties to secure the arches as soon as they are raised, and each arch is braced to the studding as soon as set in place. These arches can be raised and set in place by three or four men, while with the old method of heavy purlin and post construction, ten or fifteen may be necessary to help hoist the heavy frame.

This type of roof has the advantage of requiring less material and labor than the heavy timber roof; is just as strong and forms a mow without any obstruction.

TABLE No. 2

Table of Timber Sizes, Framing Lumber Required and Loose Hay Capacities Per 2 ft. Bent

Type Index of various sizes of Bams	SIDE WALL FRAMING				MOW FLOOR FRAMING					ROOF FRAMING										Total Feet of Lumber	Tons of Loose Hay
	Sills	Studding	Plates	Ribbons	Girder	Outer Joist	Center Joist	Joist Splices	Bridging	Lower Rafters	Upper Rafters	Lower Braces	Upper Braces	Rafter Ties	Wall Ties	Collar Beam	Lookouts				
K-12-32	ins.ft.	ins. ft.	ins.ft.	ins.ft.	ins. ft.	ins. ft.	ins. ft.	ins.ft.	ins. ft.	ins. ft.	ins. ft.	ins. ft.	ins. ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	239	1.87		
K-14-32	2x6-8	2x6-12	2x6-8	2x6-4	2x12-16	2x10-10	2x10-12	1x6-6	1x4-12	2x6-14	2x6-10	2x6-12	2x6-8	1x8-4	1x8-6	2x6-4	2x4-3	250	2.00		
K-16-32	2x6-8	2x6-14	2x6-8	2x6-4	2x12-16	2x10-10	2x10-12	1x6-6	1x4-12	2x6-14	2x6-10	2x6-12	2x6-10	1x8-6	1x8-8	2x6-5	2x4-3	263	2.18		
K-18-32	2x6-8	2x6-16	2x6-8	2x6-4	2x12-16	2x10-10	2x10-12	1x6-6	1x4-12	2x6-14	2x6-10	2x6-14	2x6-12	1x8-6	1x8-8	2x6-5	2x4-4	273	2.42		
K-20-32	2x6-8	2x6-18	2x6-8	2x6-4	2x12-16	2x10-10	2x10-12	1x6-6	1x4-12	2x6-14	2x6-10	2x6-16	2x6-12	1x8-6	1x8-8	2x6-6	2x4-4	277	2.68		
K-12-34	2x6-8	2x6-12	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-14	2x6-12	2x6-12	2x6-10	1x8-6	1x8-8	2x6-4	2x4-3	252	2.00		
K-14-34	2x6-8	2x6-14	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-14	2x6-12	2x6-14	2x6-12	1x8-6	1x8-8	2x6-5	2x4-3	267	2.56		
K-16-34	2x6-8	2x6-16	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-14	2x6-12	2x6-16	2x6-12	1x8-6	1x8-8	2x6-5	2x4-3	275	2.44		
K-18-34	2x6-8	2x6-18	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-14	2x6-12	2x6-18	2x6-12	1x8-6	1x8-8	2x6-6	2x4-4	285	2.70		
K-20-34	2x6-8	2x6-20	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-14	2x6-12	2x6-18	2x6-14	1x8-8	1x8-8	2x6-6	2x4-4	294	2.98		
K-12-36	2x6-8	2x6-12	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-16	2x6-12	2x6-14	2x6-10	1x8-6	1x8-8	2x6-5	2x4-3	263	2.22		
K-14-36	2x6-8	2x6-14	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-16	2x6-12	2x6-16	2x6-12	1x8-6	1x8-8	2x6-6	2x4-3	278	2.52		
K-16-36	2x6-8	2x6-16	2x6-8	2x6-4	2x12-16	2x10-12	2x10-12	1x6-6	1x4-12	2x6-16	2x6-12	2x6-18	2x6-12	1x8-8	1x8-8	2x6-6	2x4-3	283	2.80		
K-18-36	2x6-8	2x6-18	2x6-8	2x6-4	2x12-16	2x12-12	2x12-12	1x6-6	1x4-12	2x6-16	2x6-12	2x6-18	2x6-14	1x8-8	1x8-8	2x6-6	2x4-4	296	3.10		
K-20-36	2x6-8	2x6-20	2x6-8	2x6-4	2x12-16	2x12-12	2x12-12	1x6-6	1x4-12	2x6-16	2x6-12	2x6-18	2x6-14	1x8-8	1x8-8	2x6-7	2x4-4	301	3.38		
K-12-38	2x6-8	2x6-12	2x6-8	2x6-4	2x12-16	2x12-12	2x12-14	2x6-6	1x4-12	2x6-14	2x6-14	2x6-12	2x6-12	1x10-6	1x10-6	2x6-5	2x4-3	284	2.38		
K-14-38	2x6-8	2x6-14	2x6-8	2x6-4	2x12-16	2x12-12	2x12-14	2x6-6	1x4-12	2x6-14	2x6-14	2x6-12	2x6-12	1x10-6	1x10-6	2x6-6	2x4-3	293	2.64		
K-16-38	2x6-8	2x6-16	2x6-8	2x6-4	2x12-16	2x12-12	2x12-14	2x6-6	1x4-12	2x6-14	2x6-14	2x6-12	2x6-12	1x10-6	1x10-6	2x6-6	2x4-3	303	2.94		
K-18-38	2x6-8	2x6-18	2x6-8	2x6-4	2x12-16	2x12-12	2x12-14	2x6-6	1x4-12	2x6-14	2x6-14	2x6-18	2x6-14	1x10-8	1x10-8	2x6-7	2x4-4	318	3.24		
K-20-38	2x6-8	2x6-20	2x6-8	2x6-4	2x12-16	2x12-12	2x12-14	2x6-6	1x4-12	2x6-14	2x6-14	2x6-20	2x6-12	1x10-8	1x10-8	2x6-7	2x4-4	322	3.56		
K-12-40	2x6-8	2x6-12	2x6-8	2x6-4	2x12-16	2x12-14	2x12-14	2x6-6	1x4-12	2x6-16	2x6-14	2x6-12	2x6-14	1x10-8	1x10-8	2x6-6	2x4-4	298	2.50		
K-14-40	2x6-8	2x6-14	2x6-8	2x6-4	2x12-16	2x12-14	2x12-14	2x6-6	1x4-12	2x6-16	2x6-14	2x6-14	2x6-14	1x10-8	1x10-8	2x6-6	2x4-4	306	2.82		
K-16-40	2x6-8	2x6-16	2x6-8	2x6-4	2x12-16	2x12-14	2x12-14	2x6-6	1x4-12	2x6-16	2x6-14	2x6-16	2x6-14	1x10-8	1x10-8	2x6-6	2x4-4	314	3.14		
K-18-40	2x6-8	2x6-18	2x6-8	2x6-4	2x12-16	2x12-14	2x12-14	2x6-6	1x4-12	2x6-16	2x6-14	2x6-18	2x6-14	1x10-8	1x10-8	2x6-7	2x4-4	322	3.46		
K-20-40	2x6-8	2x6-20	2x6-8	2x6-4	2x12-16	2x12-14	2x12-14	2x6-6	1x4-12	2x6-16	2x6-14	2x6-20	2x6-14	1x10-8	1x10-8	2x6-7	2x4-4	331	3.78		

Construction Type "L"

Type "L" refers to the Gambrel roof, braced rafter type used as a superstructure on a masonry or frame basement, and is particularly recommended for general purpose or dairy barns where a driveway is required into the mow for threshing or the storage of grain previous to threshing.

This type is most suitable for horizontal siding, because the 24-inch spacing of the studding gives good nailing for the horizontal siding.

This type distributes the weight of the roof uniformly over the foundation, the same as type "K". We recommend this type most highly for Ohio, Pennsylvania, New York, and the other eastern states where it is necessary to place the grain sheaves in the barn previous to threshing. For northern states where the winters are very long and a still larger hay storage capacity is necessary we advise the Plank Truss type "N" hereafter shown.

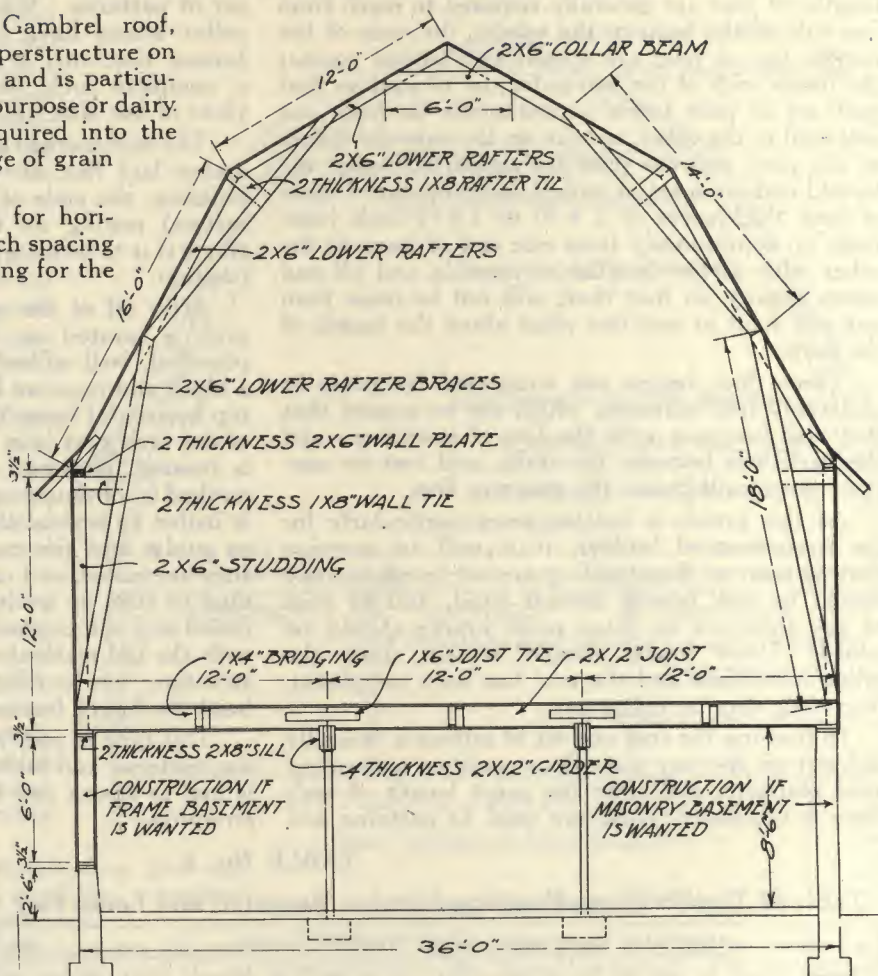
The one size illustrated by cross section "L-12-36" is for a barn having a superstructure with side walls made of 12-foot studding and of 36-foot width.

If a superstructure of the braced rafter type is built on top of a basement of wood or masonry walls, the joist of the floor which also forms the basement ceiling are set in place and the flooring is laid to within about 12 inches of the outside edge. This floor can then be used as a working platform upon which to build the braced rafter barn.

Each set of studding, lower rafters and upper rafters are all completely nailed together with the braces and tied at the corners so as to form a complete arch and these arches are raised into place one at a time starting at one gable end which is raised and well braced first.

With this method of raising, no scaffolding is required, but each arch should be well stay lathed as soon as it is raised and plumbed. It saves labor in framing, as all the heavy nailing is done on the floor in place of in the air. With this type of framing, the double plate between the studding and rafters is omitted.

The narrow matched siding running horizontal is preferred, as it ties the arches together at the studding the same as the sheathing ties the arches



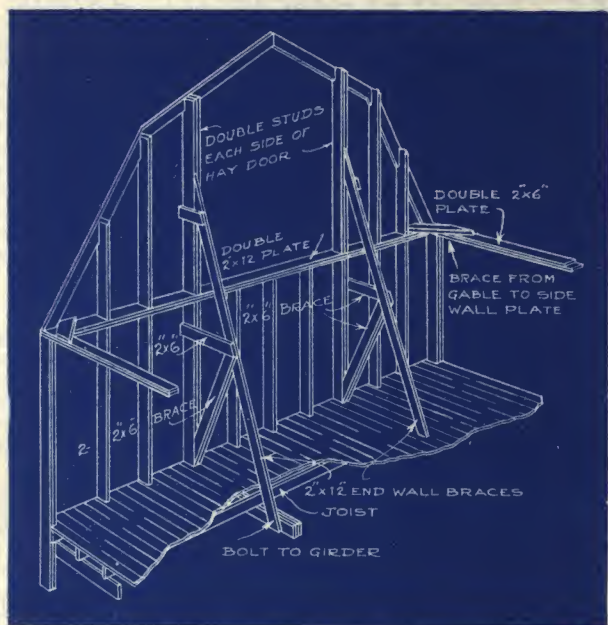
Cross Section of Type L-12-36

together at the rafters. If vertical siding is preferred, place continuous 2x4 inch nailing girts on the face of the studding and break joints so the girts will form a continuous hoop or tie around the building.

Gable End Bracing

The gable ends of the "braced rafter" barn should be braced by using double 2x12 plates on top of the lower studding and these gable plates should be stiffened by the use of the trussed end bracing shown in the accompanying illustration. A short tie of 2x8 or 2x10 material nailed to the plates diagonally across the corner should be used to strengthen the corner joint.

The gable above the plate is braced by running 2x12 braces from the studding to the girders supporting the mow floor. These braces can again be braced back to the gable to counteract the hay pressure.



Ventilation Flues

Where foul air flues are built into side walls, they may be formed by substituting 2x12 studding to form sides of foul air flues in place of 2x6 studding; also using 2x12 inch for the lower rafters and braces at plate at all places in roof containing these flues.

After the siding and sheathing has been placed on the outside face of studding and rafters, cover this surface (inside the flues) with building paper

and over this paper surface place another thickness of dressed boards running lengthwise of the flues.

Close the side of flues exposed to the interior of the barn by constructing these sides in sections, by nailing together two thicknesses of dressed and matched flooring boards (with building paper between). The boards of one thickness running at right angles to those of the other thickness and after well nailed together place these sections of the flue sides against the interior edge of the 2x12 inch plank forming the sides of the flues, so that the boards forming the inside of the flue will run lengthwise and the boards on the outside of the flues will run horizontal.

The bottom of the foul air flues should have an air intake opening equal in area to the area of the flue and is to have another opening of equal area at the ceiling of the room which is to be ventilated, provided with an air tight wood cover, hinged at bottom to swing out and provided with a ratchet for regulating and closing this opening.

The flues should extend in an air tight construction to the underside of roof at such places where ventilators or cupolas are placed on the roof directly over the flues. The air from the mow should be taken out through the same ventilator that is expected to suck the air out of a flue.

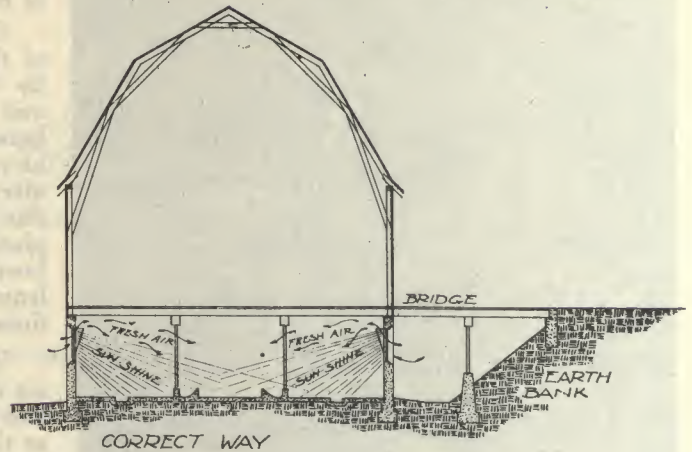
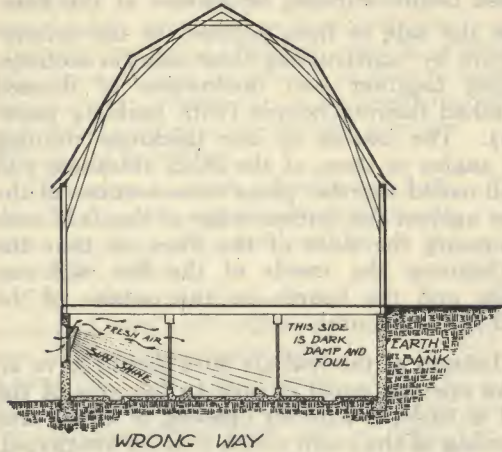
The following table gives the size of each member, the total amount of framing lumber required for the construction of the superstructure without the basement for a 2-foot bent and also gives the loose hay capacity per 2-foot bent so that one can compare the amount of lumber required for each ton of hay capacity with the other types of construction.

TABLE No. 3

Table of Timber Sizes, Framing Lumber Required and Loose Hay Capacities Per 2 ft. Bent

Type Index	SIDE WALL FRAMING				MOW FLOOR FRAMING					ROOF FRAMING								Total Feet of Lumber	Tons of Loose Hay
	Sills	Studding	Plates	Wall Braces	Girder	Outer Joist	Center Joist	Joist Splices	Bridging	Lower Rafters	Upper Rafters	Lower Braces	Upper Braces	All Brace Ties	Collar Beams	Lookouts			
L-12-32	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	ins.ft.	265	2.60
L-14-32	2x8-8	2x6-12	2x6-8	2x10-9	2x12-16	2x10-10	2x10-12	1x6-8	1x4-12	2x6-14	2x6-10	2x6-18	2x6-12	1x8-16	2x6-5	2x4-4	285	2.86	
L-16-32	2x8-8	2x6-16	2x6-8	2x10-9	2x12-16	2x10-10	2x10-12	1x6-8	1x4-12	2x6-14	2x6-10	2x6-18	2x6-14	1x8-20	2x6-5	2x4-4	295	3.12	
L-12-34	2x8-8	2x6-12	2x6-8	2x10-9	2x12-16	2x10-12	2x10-12	1x6-8	1x4-12	2x6-14	2x6-12	2x6-18	2x6-12	1x8-16	2x6-5	2x4-4	275	2.78	
L-14-34	2x8-8	2x6-14	2x6-8	2x10-9	2x12-16	2x12-12	2x12-12	1x6-8	1x4-12	2x6-14	2x6-12	2x6-18	2x6-14	1x8-18	2x6-5	2x4-4	304	3.06	
L-16-34	2x8-8	2x6-16	2x6-8	2x10-9	2x12-16	2x12-12	2x12-12	1x6-8	1x4-12	2x6-14	2x6-12	2x6-18	2x6-14	1x8-20	2x6-5	2x4-4	313	3.32	
L-12-36	2x8-8	2x6-12	2x6-8	2x10-9	2x12-16	2x12-12	2x12-12	1x6-8	1x4-12	2x6-16	2x6-12	2x6-18	2x6-14	1x8-18	2x6-6	2x4-4	298	3.14	
L-14-36	2x8-8	2x6-14	2x6-8	2x10-9	2x12-16	2x12-12	2x12-12	1x6-8	1x4-12	2x6-16	2x6-12	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	314	3.44	
L-16-36	2x8-8	2x6-16	2x6-8	2x10-9	2x12-16	2x12-12	2x12-12	1x6-8	1x4-12	2x6-16	2x6-12	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	322	3.72	
L-12-38	2x8-8	2x6-12	2x6-8	2x10-9	2x12-16	2x12-12	2x12-14	1x6-8	1x4-12	2x6-14	2x6-14	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	303	3.20	
L-14-38	2x8-8	2x6-14	2x6-8	2x10-9	2x12-16	2x12-12	2x12-14	1x6-8	1x4-12	2x6-14	2x6-14	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	318	3.50	
L-16-38	2x8-8	2x6-16	2x6-8	2x10-9	2x12-16	2x12-12	2x12-14	1x6-8	1x4-12	2x6-14	2x6-14	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	326	3.80	
L-12-40	2x8-8	2x6-12	2x6-8	2x10-9	2x12-16	2x12-14	2x12-14	1x6-8	1x4-12	2x6-16	2x6-14	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	309	3.54	
L-14-40	2x8-8	2x6-14	2x6-8	2x10-9	2x12-16	2x12-14	2x12-14	1x6-8	1x4-12	2x6-16	2x6-14	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	324	3.86	
L-16-40	2x8-8	2x6-16	2x6-8	2x10-9	2x12-16	2x12-14	2x12-14	1x6-8	1x4-12	2x6-16	2x6-14	2x6-18	2x6-14	1x8-20	2x6-6	2x4-4	343	4.18	

CUT SHOWING CORRECT CONSTRUCTION FOR BASEMENT BARN



Two Methods of Building a Bank Barn

Modern Sanitary Bank Barns

The ordinary old-fashioned stable under a bank barn was damp and warm when filled with animals in the winter time and it was damp and cool in summer. The warmth and coolness were agreeable, but disease lurked in both conditions of the stable atmosphere.

Since investigators have been looking into the germ troubles that domestic animals suffer from, attention has been directed to the objectionable features of these old-fashioned stable dungeons.

Anarchist germs prefer darkness to light. They thrive when the atmosphere is moisture laden. If the moisture comes from the breath of animals, they thrive all the better; it seems to act as a culture medium, to propagate the most undesirable of all cattle disease germs.

Sunshine and fresh air are the two principal preventatives. In this illustration the architect shows how to build a bank barn on sanitary principles—the bank is kept back away from the barn wall, and the upper floor is reached by a bridge.

Bank barns are not necessarily objectionable. Usually, they are built on an elevation where drainage may be maintained in spite of the usual barnyard proclivities to get muddy and stay muddy. Besides offering better sanitary conditions, this plan provides the best possible means for establishing warm winter corrals having gates and passage-ways leading all the way around the stable section of the barn.

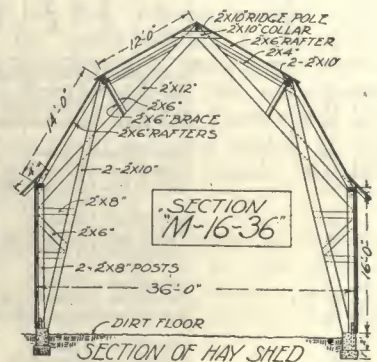
In grading the side of the bank, the earth removed to make this passage-way may be dumped in scraper loads to fill the pot holes and to grade up the corrals, lanes, etc.

Construction Type "M"

Type "M" refers to a one-story structure of a plank truss, Gambrel roof construction, consisting of trusses made of plank, spaced 12 to 16 feet apart, forming a clear span roof support by means of braced purlins spanning from one truss to the next, which in turn support the rafters. This type of construction is particularly recommended for hay storage sheds, requiring a structure free of posts and beams which would interfere with the handling of the hay.

It is best adapted for vertical siding as it does not require many studding between the trusses and the horizontal nailing girts required for the vertical siding also act as tie beams for the truss.

When used as a hay shed or implement shed it is most economical to place the trusses on substantial masonry piers and build thin walls between the piers to keep out vermin and moisture.



Construction Type "N"

Type "N" refers to the Gambrel roof, plank truss construction similar to type "M," used as a superstructure on top of a frame or masonry basement, and is particularly recommended for northern states where a very large hay mow and threshing floor must be provided in the same barn containing the live stock. It is well adapted for dairy and general purpose barns where a driveway is desired into the mow floor and where the barn is to be placed near a bank as explained on page sixteen.

It is best adapted for vertical siding because the heavy trusses do not require many vertical studding between them and the horizontal nailing girts required for the vertical siding act as tie beams for the trusses as explained for type "M."

This construction is not as economical as type "L," but may be used to best advantage where very wide barns or high hay lofts are wanted. The trusses may be built of greater dimensions, using much heavier planking than would be practical for the type "L" construction and is, therefore, recommended for the larger barns.

The one size illustrated by cross section "N-12-36" is for a barn having a superstructure above the basement, with 12-foot side wall posts and of 36-foot width.

Table No. 5 gives the amount of framing lumber (in board feet) required per bent of 14-foot length and loose hay capacity per 14-foot bent for the various sizes mentioned.

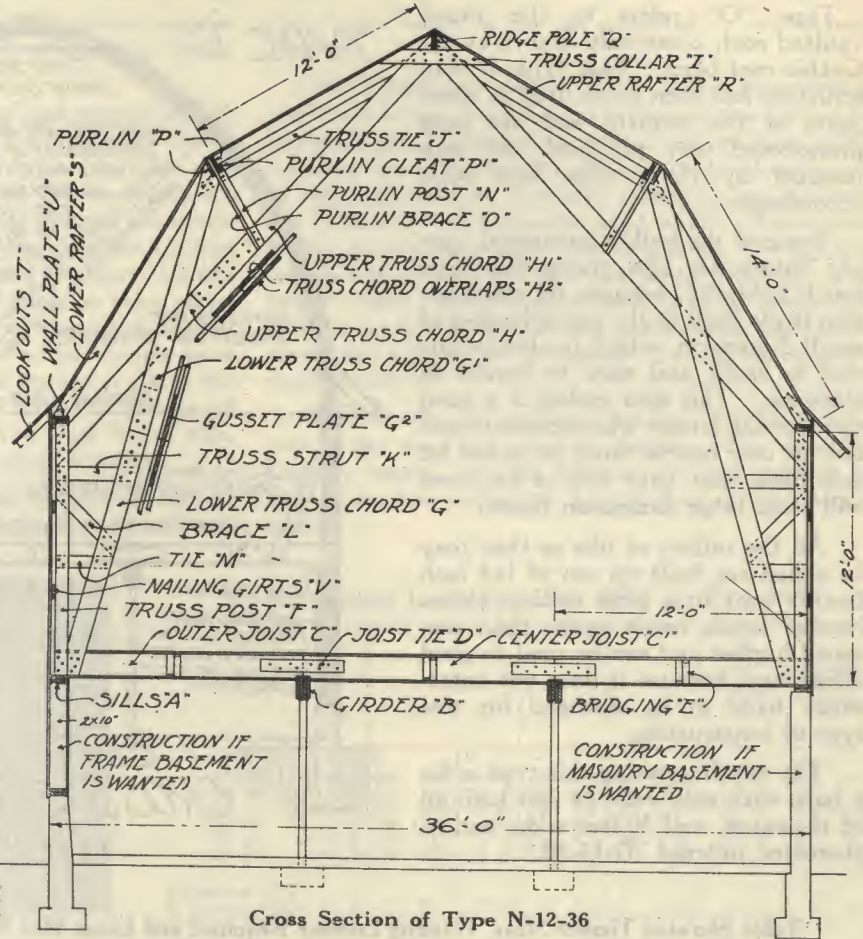


TABLE No. 5

Index	Feet of Lumber in Mow Floor Construction	Lumber in One Truss	Lumber in Roof	Lumber in Sidewalls	Total Lumber	Tons of Loose Hay
N-12-34	877 $\frac{1}{3}$	444	536	295 $\frac{1}{3}$	2152 $\frac{2}{3}$	19.09
N-14-34	877 $\frac{1}{3}$	450	536	309 $\frac{1}{3}$	2172 $\frac{2}{3}$	21.00
N-16-34	877 $\frac{1}{3}$	513 $\frac{1}{3}$	536	325 $\frac{1}{3}$	2252	22.90
N-18-34	877 $\frac{1}{3}$	538 $\frac{2}{3}$	536	341 $\frac{1}{3}$	2293 $\frac{1}{3}$	24.80
N-12-36	952	481 $\frac{2}{3}$	564	295 $\frac{1}{3}$	2293	20.83
N-14-36	952	507 $\frac{2}{3}$	564	309 $\frac{1}{3}$	2333	22.85
N-16-36	952	532 $\frac{2}{3}$	564	325 $\frac{1}{3}$	2374	24.86
N-18-36	952	560	564	341 $\frac{1}{3}$	2417 $\frac{1}{3}$	26.88
N-12-38	961 $\frac{1}{3}$	515	592	295 $\frac{1}{3}$	2363 $\frac{2}{3}$	23.46
N-14-38	961 $\frac{1}{3}$	541	592	309 $\frac{1}{3}$	2403 $\frac{2}{3}$	25.59
N-16-38	961 $\frac{1}{3}$	568	592	325 $\frac{1}{3}$	2446 $\frac{2}{3}$	27.72
N-18-38	961 $\frac{1}{3}$	594 $\frac{1}{3}$	592	341 $\frac{1}{3}$	2489	29.84

Note: A table giving the sizes and length of each timber will be furnished upon request, by our Architectural Department.

Construction Type "O"

Type "O" refers to the round vaulted roof, commonly known as the Gothic roof barn. This type of construction has been much used in some parts of the country and has been pronounced very practical and economical by those who have built accordingly.

Some of the building material supply houses are also giving this type much publicity, because its construction lends itself to the use of lumber of small dimension, which is always carried in stock and easy to handle in shipping. This also makes it a good type for the farmer who expects to saw out his own lumber from the wood lot and finds that very few of his trees will yield large dimension timber.

All the rafters or ribs as they may be called are built up out of 1x4 inch boards bent to a large circle. Green lumber bends much easier than seasoned lumber and can be used to good advantage, because it does not necessarily have to be seasoned for this type of construction.

The cut illustrating this type is for a barn with side walls 14 feet high up to the eaves, and 30 feet wide, and is, therefore, indexed "O-14-30."

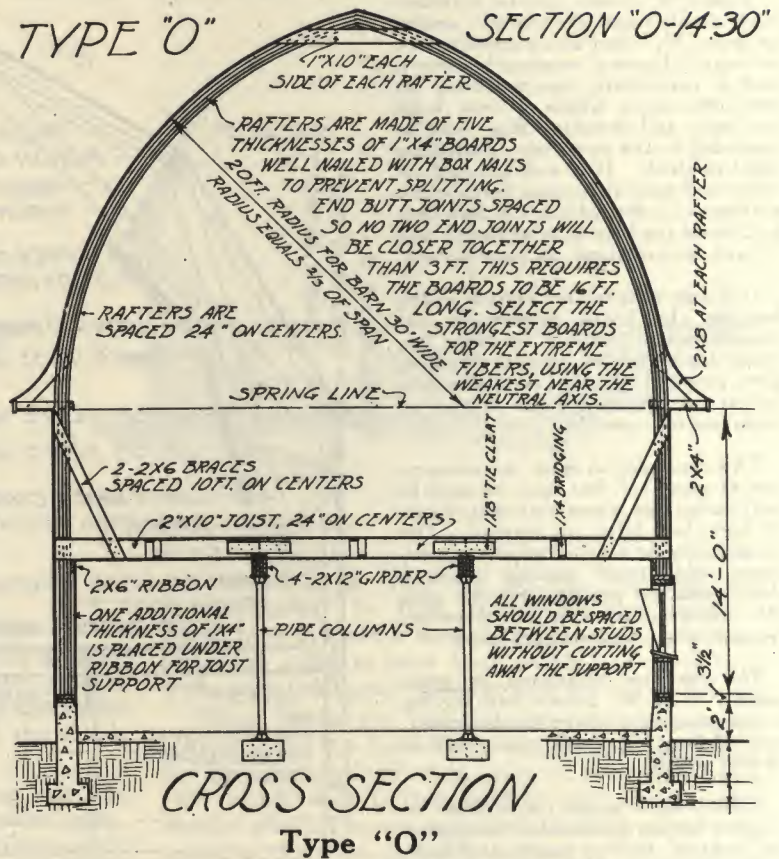


Table Showing Timber Sizes, Framing Lumber Required and Loose Hay Capacities per 2 Foot Section

Type	Sills		Ribbon		Braces 10' on Centre		Eaves Rafters		Lookout		Ribs		Collars		Girder		Outer Joists		Centre Joists		Joist Splices		Bridging		Total Ft. B.M.	Loose Hay Tons		
	Size	B.M.	Size	B.M.	No.	Size	B.M.	No.	Size	B.M.	No.	Size	B.M.	No.	Size	B.M.	No.	Size	B.M.	No.	Size	B.M.	No.	Size			B.M.	
0-10-30	2x6	8	2x6	4	4	2x6-4'	1.6	2-1x8-4'	5/8	2-2x4-2'	23/8	20-1x4-12'	10-1x4-14'	126 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	274.24	1.47	
0-12-30	2x6	8	2x6	4	4	2x6-6'	2.4	2-1x8-4'	5/8	2-2x4-2'	23/8	10-1x4-12'	20-1x4-14'	133 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	281.71	1.71	
0-14-30	2x6	8	2x6	4	4	2x6-8'	3.2	2-1x8-4'	5/8	2-2x4-2'	23/8		30-1x4-14'	140	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	289.18	1.95	
0-16-30	2x6	8	2x6	4	4	2x6-10'	4.0	2-1x8-4'	5/8	2-2x4-2'	23/8	10-1x4-16'	20-1x4-14'	146 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	296.64	2.19	
0-18-30	2x6	8	2x6	4	4	2x6-12'	4.8	2-1x8-4'	5/8	2-2x4-2'	23/8	20-1x4-16'	10-1x4-14'	153 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	304.11	2.43	
0-10-32	2x6	8	2x6	4	4	2x6-4'	1.6	2-1x8-4'	5/8	2-2x4-2'	23/8	20-1x4-12'	10-1x4-14'	126 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	274.24	1.69	
0-12-32	2x6	8	2x6	4	4	2x6-6'	2.4	2-1x8-4'	5/8	2-2x4-2'	23/8	10-1x4-12'	20-1x4-14'	133 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	281.71	1.94	
0-14-32	2x6	8	2x6	4	4	2x6-8'	3.2	2-1x8-4'	5/8	2-2x4-2'	23/8		30-1x4-14'	140	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	289.18	2.20	
0-16-32	2x6	8	2x6	4	4	2x6-10'	4.0	2-1x8-4'	5/8	2-2x4-2'	23/8	10-1x4-16'	20-1x4-14'	146 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	296.64	2.46	
0-18-32	2x6	8	2x6	4	4	2x6-12'	4.8	2-1x8-4'	5/8	2-2x4-2'	23/8	20-1x4-16'	10-1x4-14'	153 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	304.11	2.70	
0-10-34	2x6	8	2x6	4	4	2x6-4'	1.6	2-1x8-4'	5/8	2-2x4-2'	23/8	10-1x4-12'	20-1x4-14'	133 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	284.25	1.93	
0-12-34	2x6	8	2x6	4	4	2x6-6'	2.4	2-1x8-4'	5/8	2-2x4-2'	23/8		30-1x4-14'	140	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	291.72	2.22	
0-14-34	2x6	8	2x6	4	4	2x6-8'	3.2	2-1x8-4'	5/8	2-2x4-2'	23/8	10-1x4-16'	20-1x4-14'	146 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	299.18	2.49	
0-16-34	2x6	8	2x6	4	4	2x6-10'	4.0	2-1x8-4'	5/8	2-2x4-2'	23/8	20-1x4-16'	10-1x4-14'	153 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8		6-1x4-2'	4	306.65	2.76	
0-18-34	2x6	8	2x6	4	4	2x6-12'	4.8	2-1x8-4'	5/8	2-2x4-2'	23/8	40-1x4-12'		160	2-2x10-10'	33 3/8	2x12	32	2-2x12-12'	48	1-2x12-12'	24	6-1x4-2 3/4	4.5	326.62	3.03		
0-10-36	2x6	8	2x6	4	4	2x6-4'	1.6	2-1x8-4'	5/8	2-2x4-2'	23/8		30-1x4-14'	140	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8	2-1x6-4'	4	6-1x4-2'	4	294.92	2.24
0-12-36	2x6	8	2x6	4	4	2x6-6'	2.4	2-1x8-4'	5/8	2-2x4-2'	23/8	10-1x4-16'	20-1x4-14'	146 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8	2-1x6-4'	4	6-1x4-2'	4	302.38	2.53
0-14-36	2x6	8	2x6	4	4	2x6-8'	3.2	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	20-1x4-16'	10-1x4-14'	153 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8	2-1x6-4'	4	6-1x4-2'	4	310.30	2.82
0-16-36	2x6	8	2x6	4	4	2x6-10'	4.0	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	40-1x4-12'		160	2-2x10-10'	33 3/8	2x12	32	2-2x10-12'	40	1-2x10-10'	16 3/8	2-1x6-4'	4	6-1x4-2'	4	317.77	3.10
0-18-36	2x6	8	2x6	4	4	2x6-12'	4.8	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	30-1x4-12'	10-1x4-14'	166 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-12'	48	1-2x12-12'	24	2-1x6-4'	4	6-1x4-2 3/4	4.5	337.73	3.39
0-10-38	2x6	8	2x6	4	4	2x6-4'	1.6	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	10-1x4-16'	20-1x4-14'	146 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-12'	48	1-2x12-12'	28	2-1x6-4'	4	6-1x4-2 3/4	4.5	318.53	2.58
0-12-38	2x6	8	2x6	4	4	2x6-6'	2.4	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	20-1x4-16'	10-1x4-14'	153 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-12'	48	1-2x12-12'	28	2-1x6-4'	4	6-1x4-2 3/4	4.5	326.00	2.88
0-14-38	2x6	8	2x6	4	4	2x6-8'	3.2	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	40-1x4-12'		160	2-2x10-10'	33 3/8	2x12	32	2-2x12-12'	48	1-2x12-12'	28	2-1x6-4'	4	6-1x4-2 3/4	4.5	333.47	3.18
0-16-38	2x6	8	2x6	4	4	2x6-10'	4.0	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	30-1x4-12'	10-1x4-14'	166 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-12'	48	1-2x12-12'	28	2-1x6-4'	4	6-1x4-2 3/4	4.5	340.93	3.49
0-18-38	2x6	8	2x6	4	4	2x6-12'	4.8	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	20-1x4-12'	20-1x4-14'	173 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-12'	48	1-2x12-12'	28	2-1x6-4'	4	6-1x4-2 3/4	4.5	348.40	3.79
0-10-40	2x6	8	2x6	4	4	2x6-4'	1.6	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	40-1x4-12'		160	2-2x10-10'	33 3/8	2x12	32	2-2x12-14'	56	1-2x12-14'	28			6-1x4-2 3/4	4.5	329.20	2.95
0-12-40	2x6	8	2x6	4	4	2x6-6'	2.4	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	30-1x4-12'	10-1x4-14'	166 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-14'	56	1-2x12-14'	28			6-1x4-2 3/4	4.5	336.67	3.27
0-14-40	2x6	8	2x6	4	4	2x6-8'	3.2	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	20-1x4-12'	20-1x4-14'	173 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-14'	56	1-2x12-14'	28			6-1x4-2 3/4	4.5	344.13	3.59
0-16-40	2x6	8	2x6	4	4	2x6-10'	4.0	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	10-1x4-12'	30-1x4-14'	173 3/8	2-2x10-10'	33 3/8	2x12	32	2-2x12-14'	56	1-2x12-14'	28			6-1x4-2 3/4	4.5	351.60	3.91
0-18-40	2x6	8	2x6	4	4	2x6-12'	4.8	2-1x8-4'	5/8	2-2x4-2 3/8	31/8	20-1x4-12'		180	2-2x10-10'	33 3/8	2x12	32	2-2x12-14'	56	1-2x12-14'	28			6-1x4-2 3/4	4.5	359.07	4.23

Method of Constructing Ribs for Type "O" Roofs

The accompanying illustration shows the method used for staking out the ground in preparing to build the gothic roof rib.

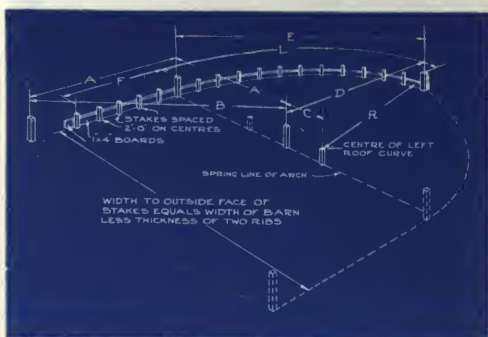
Select a level place on the ground and measure off the distances A, B, C, D and E given on the table below for the width of barn and wall height of the barn to be built. Set stakes firmly in the ground at the points these measurements indicate. Be careful to make the measurements accurately. Stakes should be vertical and firm. Measurements to stakes on which the ribs are to be formed should be made to the face on which the boards are nailed. By lining up along stakes already set, drive other stakes firmly at intervals of two feet along side wall space indicated at F and around the roof curve shown at L. To form the curve, hold the end of a tape line on the stake at the center of the roof curve and measure off the distance R, for the width of barn as given in the table, setting stakes two feet from center to center of stakes.

Start at the stake at the point of the roof and nail the first course of 1 x 4 boards with the smallest nails which will hold

them to the stakes, so that the completed rib may be easily removed.

The strength and stiffness of this construction depends very much on the good judgment and honest intentions of the carpenters in not allowing any two of the end joints of the members of a rib to come opposite or very close together and in having all members thoroughly nailed, but not with nails of a diameter that will cause the wood to split. A good specification for constructing the ribs would be: The ribs shall contain not over one end butt joint in any three feet of its length. Each member shall be carefully nailed to the other members with at least three nails to each linear foot, spaced zigzag, and with nails of a thickness that will not cause the wood to split.

When two ribs are completed they may be nailed together with a collar beam and raised into position. They should be carefully braced, and the different ribs held together by ribbons and floor joists until the mow floor and sheathing is applied.



Measurements for Laying Out Ribs for Type "O"

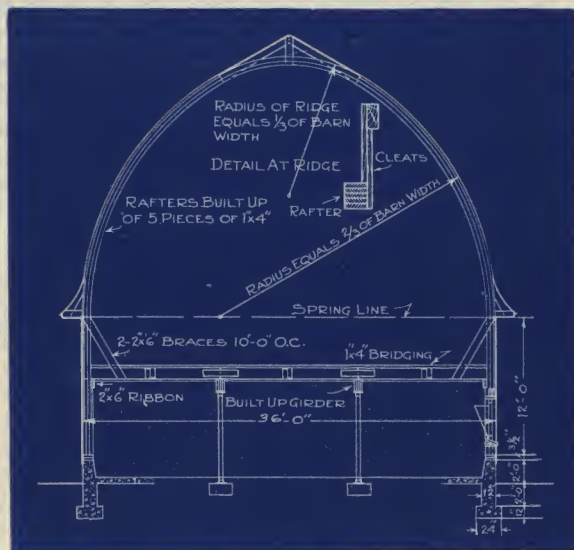
Barn Width	A	B	C	D	E	Radius for Staking Out R	Outside Rib Length L
30' 0"	14' 8"	20' 8 7/8"	5' 0"	18' 11 1/4"	23' 11 3/8"	19' 8"	26' 4 1/4"
30' 0"	15' 8"	22' 1 1/8"	5' 4"	20' 2 1/4"	25' 7"	21' 0"	28' 1 1/8"
34' 0"	16' 8"	23' 6 1/4"	5' 8"	21' 6 1/4"	27' 2 1/8"	22' 4"	29' 10 1/8"
36' 0"	17' 8"	24' 11 1/8"	6' 0"	22' 9 3/4"	28' 10 1/8"	23' 8"	31' 7 1/8"
38' 0"	18' 8"	26' 4 1/4"	6' 4"	24' 1 1/8"	30' 5 1/8"	25' 0"	33' 4 1/8"
40' 0"	19' 8"	27' 9 1/4"	6' 8"	25' 4 1/4"	32' 1 1/8"	26' 4"	35' 1 1/8"
Difference for 2' 0" in barn width	1' 0"	1' 5"	0' 4"	1' 3 1/2"	1' 7 1/8"	1' 4"	1' 9 1/8"

Construction Type "OC"

Type "OC" is similar to type "O" except at the ridge. Here the laminated or "built up" rafter or roof rib continues unbroken over the top with a little sharper curvature than along the sides of the roof. This eliminates the joint at the top and also saves some cutting necessary with type "O" by allowing boards to continue on past the ridge line during the construction of the rib.

Instead of using collars on each side of the roof rib at the ridge, short rafters are nailed tangent to the curve of the rib. These rafters meet and form the ridge and at the same time they brace the roof firmly through the center.

The amount of material required for the construction of this type of barn is almost exactly the same as required by type "O". To lay out this type of roof, follow the same general directions given for type "O," except in the arrangement of the stakes which should be set according to the plan shown in the illustration and table of measurements on the following page. The same care should be used in breaking joints and nailing as already outlined for type "O" and the method of erection is the same.



Showing Method and Measurements for Laying Out Type "OC"



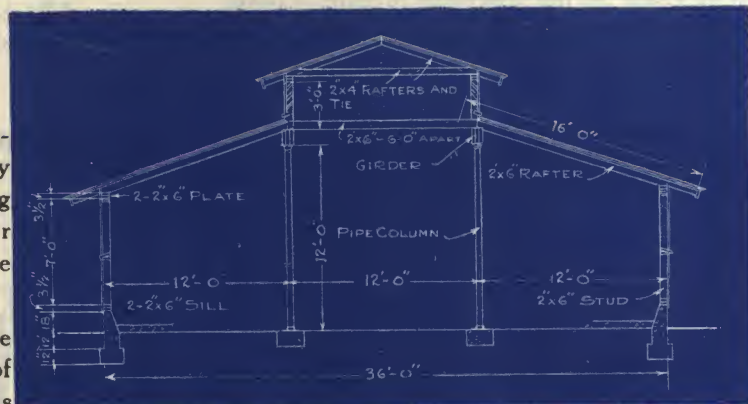
Width of Barn	W	X	Y	Z
30	13' 8"	9' 8"	10' 0"	19' 8"
32	14' 7 $\frac{3}{8}$ "	10' 4"	10' 8"	21' 0"
34	15' 6 $\frac{5}{8}$ "	11' 0"	11' 4"	22' 4"
36	16' 6"	11' 8"	12' 0"	23' 8"
38	17' 5 $\frac{1}{4}$ "	12' 4"	12' 8"	25' 0"
40	18' 4 $\frac{5}{8}$ "	13' 0"	13' 4"	26' 4"
Difference for 2'-0" in barn width	0' 11 $\frac{3}{8}$ "	0' 8"	0' 8"	1' 4"

Construction Type "D"

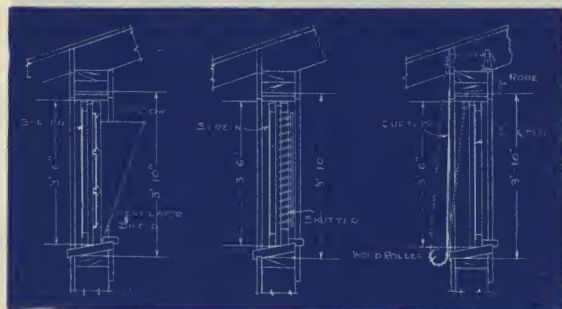
Type "D" is designed to meet the requirements of warm climates where plenty of air space is desirable at all times during the year and where a free movement of air through the barn is necessary during the warm summer months.

Unlike northern types of barns the cubical contents per animal in this type of barn is made quite large and the monitor is arranged to facilitate the escape of heat during several months out of the year. Louvres are shown on each side of the monitor in the accompanying cut of a 36-foot type "D" barn. The cross draft through this monitor will carry away the heat which would otherwise tend to accumulate under the roof. Windows with curtains or shutters may be substituted for these louvres where such an arrangement is preferred.

The windows in this type of barn should be arranged with ventilating shields which will permit ventilation suitable for all kinds of weather. In localities where flies are troublesome dark curtains arranged as shown in the accompanying illustration are sometimes used to darken the dairy barn and drive the flies out, and in other cases the windows have been arranged with shutters for the same purpose. All windows and doors in type "D" barns are screened.



Type "D" Barn for Warm Climates



Showing Different Types of Window Screens

This type is often used in connection with other buildings such as hay barns and granaries or cribs or barns for horses and mules. In such cases they may be built as an L against the other building in such a way that feeding labor may be reduced to a minimum by bringing the dairy barn and feed supply together.

Type "D" barns may be furnished in all the widths used in other types of construction and, like the other types, are commonly used with the standard floor plans shown on pages 37 to 42 inclusive.

The outside walls may be built of wood framing, tile, concrete, concrete blocks or brick.

Comparing the Cost of Construction

In comparing the cost of one type with another, it is estimated that type "K" is the most economical where an average amount of hay is to be stored in the mow, and that type "O" is the most economical where a large hay mow is wanted.

These conclusions are reached by estimating the amount of framing lumber required to construct a barn of a given size by each of the four types K, L, N and O. Estimating the amount of hay storage each type will contain and then estimating the amount of framing lumber required by each type per ton of hay storage.

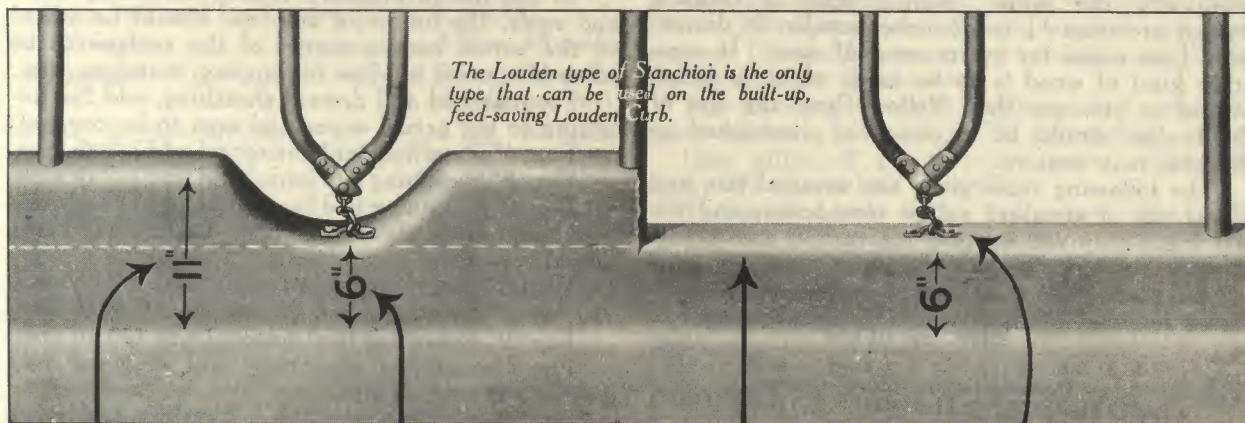
Table No. 5 gives the amount of framing lumber and hay storage capacity, and framing lumber required per ton of hay, for the four types of construction, based on a barn 36 x 70 feet with side

walls extending 12 feet high above the basement ceiling. This table does not include any material for basement walls as this would be the same in all cases.

TABLE NO. 5.

Type of Barn	Lumber for framing both ends of barn in board feet.	Framing lumber for balance of barn.	Total board feet of framing lumber.	Loose hay capacity in tons.	Feet of lumber required per ton of hay capacity.
Type K	1584	9960	11544	108	107
Type L	1584	10530	12114	109	111
Type N	1820	11465	13285	104	127
Type O	1620	10620	12240	122	100

Louden High Built-Up Manger Curb and the Low Level Curb



The Louden Built-Up Curb is 11 inches high—5 inches higher than the ordinary level curbs.

The lowest point in the "cut-out" is the same height as the top of the level curb.

The Low Level Curb makes it possible for the cow to waste her feed.

The Louden Stanchions can be hung on the level curb if desired.

The cut above shows the true relationship between the ordinary level manger curb and the Louden Built-Up, feed-saving manger curb, with cut-out for stanchion. The lowest point in the cut-out is the same height as the top of the level curb. The top of the Louden curb is 5 inches higher, to prevent the cow from nosing feed out of the manger.

The single-chain-hung stanchion with V-shaped ends is the only type of stanchion that can be hung in the built-up curb. Double-chain-hung or square bottomed stanchions must be hung on a level curb, and to permit them to hang low enough for the cows to lie down comfortably the curb must be not more than 6 inches high. The Louden stanchion hangs equally well on level or built-up curb, but the advantages of the built-up curb are so marked that we always recommend it.

If a person could watch a cow after each feeding and really note how much she nosed out over the low level curb at the side of the stall it would not take long to convince such a person that the low level curb is one of the worst feed "wasters" the dairyman has to contend with. During these times feed is really money. It takes several men to care for the crops, harvest the grain, and such work up until the feed is ready for the herd—every ounce wasted means not only its own worth gone, but also carries with it all the labor which made the feed possible. With the shortage of labor on the farm today such a loss of feed is really a serious proposition.

Frame Construction

The steady increase in the price of lumber and building materials has necessitated a closer calculation of their strength.

Economy prescribes that each piece shall be only as large as needed to safely withstand the strains which it will be subjected to, and so placed that it will be the strongest.

In the largest and best barns built today you will seldom see timber thicker than two inches. This is partly due to small dealers carrying a limited assortment of sizes, and to a greater extent to the present day calculations of architects.

Most modern barns are built with self-supporting roofs, as this type of construction eliminates heavy beams and posts and reduces cost. This type of roof resembles the hull of a boat turned upside down, and consists of built up plank arches reinforced with splice-braces at angles, spanning from one side wall to the other. This roof usually has four surfaces, the lower two being steep and the upper two about quarter pitch.

The sizes of all framing timber as shown in our designs are figured on the basis of Southern Yellow Pine. However, the figures for Douglas Fir are practically the same. Actual sizes of framing lumber are from $\frac{1}{4}$ to $\frac{5}{8}$ inches smaller in dimensions than called for by its nominal sizes. If some other kind of wood is to be used, which is either weaker or stronger than Yellow Pine, the size of the timber should be increased or diminished as the case may require.

The following table gives the nominal size and actual size of standard yellow pine beams and the safe loads they will support for various spans.

TABLE No. 6

Safe Load in Pounds Uniformly Distributed for Yellow Pine Beams Supported at Both Ends

Span in Feet	SIZE OF BEAM						
	2x6	2x8	2x10	2x12	2x14	2x16	2x18
	Dressed to the following sizes						
	$1\frac{5}{8} \times 5\frac{1}{2}$	$1\frac{7}{8} \times 7\frac{1}{2}$	$1\frac{9}{8} \times 9\frac{1}{2}$	$1\frac{11}{8} \times 11\frac{1}{2}$	$1\frac{13}{8} \times 13\frac{1}{2}$	$1\frac{15}{8} \times 15\frac{1}{2}$	$1\frac{17}{8} \times 17\frac{1}{2}$
6	1714	3047	4488	7163	9872	14020	17846
8	1285	2285	3666	5372	7404	10515	13398
10	1028	1828	2933	4298	5923	8412	10718
12	857	1523	2444	3582	4936	7010	8932
14	734	1306	2095	3070	4231	6008	7656
16	642	1142	1833	2686	3702	5256	6699
18		1016	1629	2388	3291	4505	5954
20		914	1466	2149	2961	4206	5359
22			1333	1954	2692	3823	4872
24			1222	1791	2469	3505	4466
26				1653	2278	3235	4122
28				1535	2115	3040	3828
30					1974	2804	3572
32					1851	2628	3349

Note: The above loads are calculated for a fiber stress of 1,800 pounds per square inch, safety factor 4. Modulus of rupture 7,200 pounds per square inch.

Loads above heavy horizontal lines calculated for both strength and stiffness. Loads below heavy horizontal lines are for strength only and will deflect more than one-thirtieth of an inch per foot of span and should not be used with plastered ceilings.

Wood Columns

The following table gives the nominal size and actual size of yellow pine posts and the safe loads, in tons, they will support for various lengths when used as columns.

TABLE No. 7

Nominal Size, Inches	Actual Size, Inches	Length in Feet	Safe Load in Tons
6 x 6	$5\frac{1}{2} \times 5\frac{1}{2}$	8	12.65
6 x 6	$5\frac{1}{2} \times 5\frac{1}{2}$	10	11.37
6 x 6	$5\frac{1}{2} \times 5\frac{1}{2}$	12	10.22
6 x 6	$5\frac{1}{2} \times 5\frac{1}{2}$	14	9.23
8 x 8	$7\frac{1}{2} \times 7\frac{1}{2}$	8	26.13
8 x 8	$7\frac{1}{2} \times 7\frac{1}{2}$	10	24.32
8 x 8	$7\frac{1}{2} \times 7\frac{1}{2}$	12	22.52
8 x 8	$7\frac{1}{2} \times 7\frac{1}{2}$	14	20.84
8 x 8	$7\frac{1}{2} \times 7\frac{1}{2}$	16	19.27

The safe loads given are based on a compression strength of 1,100 pounds per square inch parallel with the grain.

Ordinary Lumber Waste

In the use of ordinary lumber on walls, floors and roofs, the following amounts should be added to the actual measurements of the surface to be covered in order to allow for lapping, matching, etc.:

For matched and dressed sheathing, add the following to the actual superficial area to be covered:

For 6" Sheathing laid horizontal add $\frac{1}{5}$ to area.

For 8" Sheathing laid horizontal add $\frac{1}{7}$ to area.

For 10" Sheathing laid horizontal add $\frac{1}{9}$ to area.

Unmatched sheathing laid horizontal takes actual superficial area of wall.

For 6" Sheathing laid diagonal add $\frac{1}{4}$ to area.

For 8" Sheathing laid diagonal add $\frac{1}{6}$ to area.

For 10" Sheathing laid diagonal add $\frac{1}{8}$ to area.

For Unmatched sheathing laid diagonal add 8 or 10 per cent to area.

For drop siding and beaded ceiling add same amount as for sheathing laid horizontal.

Common roof sheathing laid 3" apart deduct $\frac{1}{3}$ from actual superficial area.

Add the following to flooring:

For 3" matched flooring add $\frac{1}{2}$ to superficial area.

For 4" matched flooring add $\frac{1}{3}$ to superficial area.

For 6" matched flooring add $\frac{1}{5}$ to superficial area.

Siding:

For lap siding laid 4" to weather add $\frac{1}{2}$ to area.

For lap siding laid $4\frac{1}{2}$ " to weather add $\frac{1}{3}$ to area.

Shingles laid 4" to weather 1000 per square.

Shingles laid $4\frac{1}{2}$ " to weather 900 per square.

Shingles laid 5" to weather 800 per square.

(250 shingles equal 1 bundle.)

For composition roofing take actual roof area in squares (100 sq. ft.).

Gas Pipe Columns

Columns made of gas pipe filled with rich cement mortar are often used in dairy barns because they take up so little space, are permanent, sanitary and do not obstruct the view so much as the large

wood posts. We highly recommend the use of pipe columns for all kinds of farm buildings.

The following table gives the safe load in pounds that can be supported on gas pipe columns.

TABLE No. 8

COLUMNS	Nominal Size Inches	External Diameter Inches	Thickness Inches	Weight per Foot	Area of Section	Safe Load in Pounds for Gas Pipe Columns Length in Feet					
						7	8	9	10	12	14
	¾	1.05	.113	1.13	.424	806					
	1	1.31	.134	1.67	.562	2181	1600				
	1¼	1.666	.140	2.26	.846	4549	3740	3183			
	1½	1.875	.145	2.69	.983	6391	5300	5136	4448		
	2	2.375	.154	3.67	1.29	9314	8591	7914	7193		
	2½	2.875	.204	5.77	1.59	12537	11800	11020	10420		
	3	3.5	.217	7.55	2.26	19165	18280	17500	16700	15040	
	3½	4	.226	9.05	2.59	22860	22040	21320	20500	18780	17240
	4	4.5	.237	10.73	3.33	30103	28900	28220	27300	25440	23560
	4½	5	.247	12.49	3.73	34502	33560	32660	31760	29800	27960
	5	5.563	.259	14.56	4.17	38906	37520	37520	36520	34620	32520
	6	6.625	.280	18.77	5.57	54055	50120	50120	50120	48780	46640
	7	7.625	.301	23.41	7.18	70938	64620	64620	64620	64620	62640
	8	8.625	.322	28.35	8.14	81278	73260	73260	73260	73260	73260

Nails

Nails required for various kinds of work:

1000 Shingles	5 lbs.	4d nails
1000 Laths	7 lbs.	3d nails
	(4 nails to lath)	
1000 sq. ft. Beveled Siding	18 lbs.	6d nails
1000 sq. ft. Sheathing	20 lbs.	8d nails
1000 sq. ft. Sheathing	25 lbs.	10d nails
1000 sq. ft. Flooring	30 lbs.	8d nails
1000 sq. ft. Flooring	40 lbs.	10d nails
1000 sq. ft. Studding	15 lbs.	10d, and
	5 lbs.	20d nails
1000 sq. ft. 1" x 2" Furring	10 lbs.	10d nails
100 pieces Bridging	6¼ lbs.	10d nails

Guesswork in building a barn is not only slow, wasteful, and expensive, but it results in a barn that is a constant source of dissatisfaction as long as it stands.

You expect that barn you are planning to build to serve you the rest of your life—then why not get it right? The few days or weeks you spend getting ready for a right start will be regained by the time the building is completed, and the few dollars you spend for plans will be saved many times over during its construction.

But most important of all, you will have a barn that exactly meets your needs—convenient, labor-saving, properly lighted and ventilated, free from waste space—in fact, the ideal barn for you, and one you will take pleasure and pride in.

No other organization of architects is so well equipped to give you expert advisory service and practical barn plans as the Architectural Department of The Loudon Machinery Company.

Unlike most architectural concerns, its services are limited strictly to one line of work—Agricultural Architecture. Every man on the staff is a **Farm Building Specialist**. As a result they are more competent to advise you on your farm building problems than any organization of general practicing architects.

Our staff of skilled architects and builders is supplemented by an auxiliary of seventy-five practical field men who know barns from basement to ridgepole.

There is probably a field man in your territory. Write us about your building plans and we will have him see you, if possible, and talk the matter over with you. There's no expense—no obligation. We're glad to confer with you about the matter that's nearest our hearts—the building of better barns—and we sincerely believe we can benefit you.

Painting

One gallon ready-mixed paint will cover from 250 to 300 square feet of wood surface with one coat, or 175 to 225 square feet two coats, or 125 to 150 square feet three coats.

For covering metallic surfaces, one gallon of paint will cover from 300 to 350 square feet.

One gallon of paint, prime color, will cover about 450 square feet of surface.

Prepared shingle stains will cover about 200 square feet of surface per gallon, if applied with brush, or one gallon will be sufficient for dipping about 500 shingles.

One pound of putty will be sufficient for about 180 square feet of wall surface.

Doors

Sliding doors have many advantages over those attached by ordinary hinges. If properly built with a 2-inch lap around the edges, and provided with Loudon stay rollers, they can be made practically air tight, and at the same time work free and loose in opening and closing.

Doors built up out of matched flooring are very strong, and if made double thickness with one thickness running at right angles to the other, will prevent warping, and if building paper is placed between the two thicknesses, it will make a well insulated surface.

Care must be taken in the selection of hangers and track. Choose a track that will not sag, hold water, or become clogged by birds' nests, snow, ice, etc. See page 111.

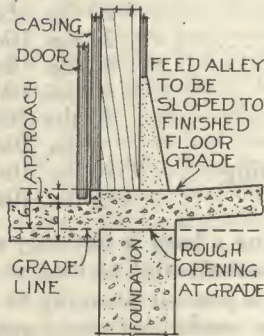
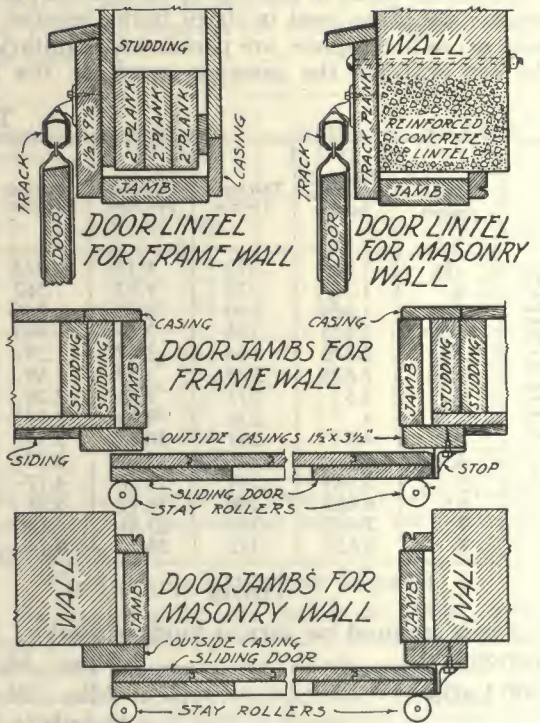
A hanger with a hinge is best, as cattle can not tear the door off the track when it is fitted with this type. Double trolleys run smoother and the roller bearing wheels make operation easy. Sliding doors take up less space and can not blow open or shut.

Doors should be provided with latches or other fastening device that will automatically fasten the door when it is closed, and they should be so constructed that the stock can not open them by pushing or rubbing with their horns.

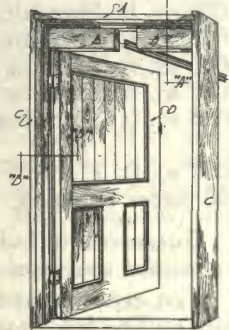
For large driveway doors which must admit a hay wagon, it is advisable to have a small entrance door hinged within the large door so a person may enter through the small door without having to open the large door. Driveway doors should be at least 12 feet wide and 12 feet high, and, where large loads of loose hay are handled, it is best to make them 14 feet wide by 13 feet high.

Other doors, as far as live stock is concerned, should be: for milk cows, 3' 6" wide by 7' 0" high; for horses, 3' 6" wide by 7' 6" high; for loose cattle, 8' 0" wide by 7' 6" high; and for sheep, 4' 0" wide by 7' 0" high. Where a trolley track is to pass through a sliding door, it should never be less than 7' 6" high, so the track will hang 7' 0" above the floor to clear a man's head. It is good practice to make all doors where cows or horses must enter at least 4 feet wide by 8 feet high.

Doors located between box stalls and paddock are very convenient if made in two halves, the upper half sliding on a track in the usual way and the lower half on hinges, so the lower half may be latched to keep the stock out or in while the upper half may be partly opened to suit the amount of ventilation desired.



Section through bottom of Sliding Door



Detail of Hinged Door Construction, Showing Opening for Track

Gable hay doors, where a hay carrier is used, should be 8 to 10 feet wide, and never less than 10 feet high from hay track to sill.

Putting in the Concrete Door Sills

The rough opening for doors in the foundation walls should be left 6 inches below the finished floor level. This allows the floor to be carried as a continuous sheet of concrete over the sill. Where the sill is carried up to the finished door sill height it is much less convenient to finish it neatly at exactly the right level to meet the finished floor. If the height is not exactly right at both litter and feed alleys it is necessary to cut away the concrete sill after it has had time to harden. This is expensive and would be avoided by the method suggested. Care should be used to make a good foundation for the floor to prevent settlement and avoid cracking at the junction of the floor and sill.

Windows

As stated on page five, "It is impossible to get too much light in a barn for any kind of live stock." The spacing of the windows in a barn depends on the kind of material the walls are built out of and a rigid rule can not be laid down, but we have worked out a table showing the spacing we would recommend for various sizes of windows, providing the wall construction will admit, as follows:

TABLE No. 9
SPACING OF WINDOWS

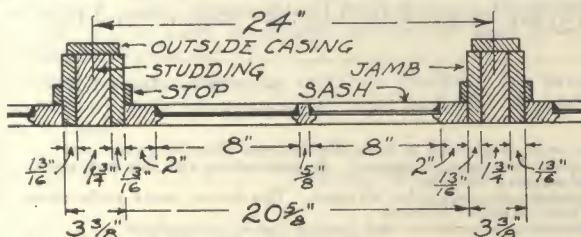
Given in feet and inches, from center to center of windows.

Size of glass	4-light sash	6-light sash	9-light sash
8" x 10"	2' 4" or less	2' 10" or less	4' 4" or less
8" x 12"	2' 4" or less	3' 5" or less	4' 4" or less
9" x 12"	2' 7" or less	3' 11" or less	5' 11" or less
9" x 14"	3' 0" or less	4' 6" or less	1' 10" or less
10" x 12"	3' 0" or less	4' 4" or less	6' 6" or less
10" x 14"	3' 4" or less	5' 0" or less	7' 8" or less
10" x 16"	3' 10" or less	5' 10" or less	8' 9" or less
10" x 18"	4' 4" or less	6' 6" or less	9' 10" or less
12" x 14"	4' 0" or less	6' 1" or less	9' 2" or less
12" x 16"	4' 8" or less	7' 0" or less	10' 5" or less

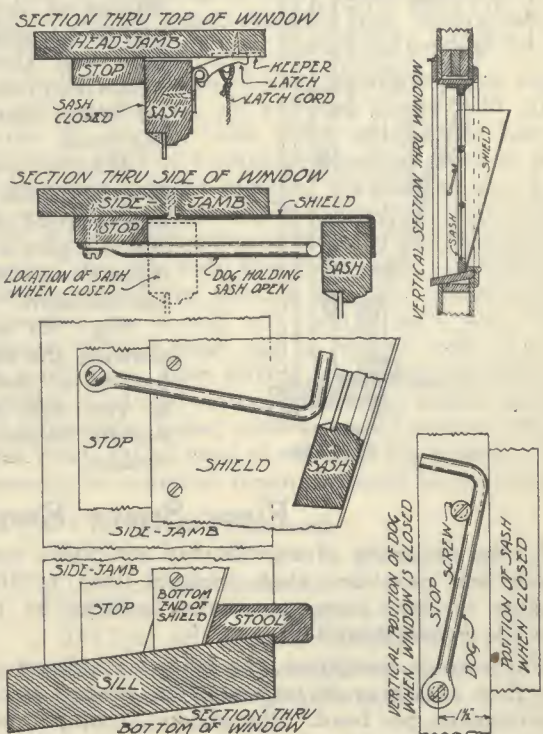
This table is calculated for dairy barn requirements. In most states, it has become a law that the dairy barn must have at least 4 square feet of window glass surface per head, and we recommend the following: For horses, 4 square feet; for milk cows, 4 square feet; for loose cattle, 2½ square feet; and for sheep, 1 square foot.

When the side walls are of frame construction, they are in most every case built of 2-inch plank studding spaced 24 inches on centers for the lower story side walls. This custom has been adopted by builders because the length of all stock boards come in multiples of 2 feet, and with the studding, joist, etc., all spaced 2 feet on centers, any stock length of enclosing or floor boards can be applied without waste.

Therefore, it is advisable to space the windows in frame barns so they will work in without cutting out or shifting the spacing of the studding. This can be done by adopting a sash that will fit in between the 24-inch spacing. A sash with two 8-inch glass in width will meet these requirements, as illustrated by the following sketch:



PLAN OF WINDOWS BETWEEN STUDDING



We, therefore, recommend the following size windows:

For dairy cows:

6 lights 8" x 10" spaced 24" on centers

For horses:

6 lights 8" x 10" spaced 24" on centers

For loose cattle:

4 lights 8" x 10" spaced 24" on centers

For sheep:

4 lights 8" x 10" spaced 24" on centers

Comfort and Air

Fresh air in the barn is as necessary for the comfort of the animals as fresh water and pure food. According to experts the average cow consumes more **pounds** of air during the 24 hours than she does of either food or water. Conservative estimates place the weight of air consumed by a 1,000 pound cow at 224 pounds.

Louden Window Ventilators make possible an abundance of fresh air without draughts. Fig. 986 shows the window closed, and Fig. 987 shows it opened to let in air at the top, while Fig. 988 shows it open for air to enter at both top and bottom. A moment's examination of these illustrations shows the adaptability of the Louden Window Ventilator to meet the different conditions of the weather. On cold nights the ventilator open at the top only will throw the air upward where it will mingle with the warmer air before coming in contact with the cows.

When it is necessary to keep the cows in the barn on warm nights the arrangement of the window in Fig. 988 will give a cooling and comforting active circulation of air throughout the barn.

Fig. 989 is a vertical section showing the sash and the top and bottom of the window frame cut in two and the sash open and slightly raised. Write for special booklet.

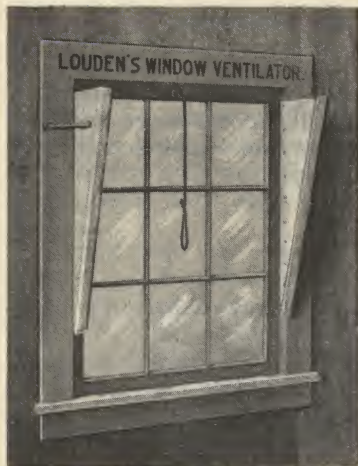


Fig. 986.

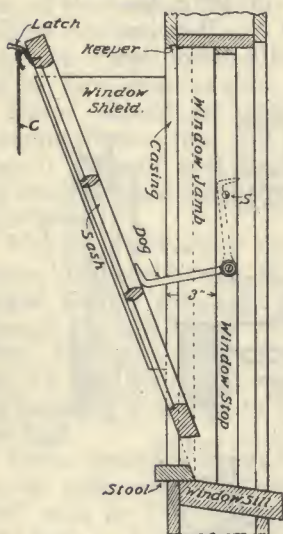


Fig. 989.

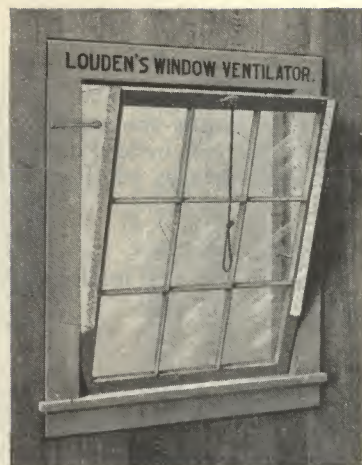


Fig. 987.



Fig. 988.

Floor Space Required for Live Stock

In the designing of any kind of structure, one of the first questions that presents itself to the designer is, how large must the building be to meet the requirements?

For average conditions, the following amount of barn floor area may be estimated for various stock requirements, per head: For sheep, 12 sq. ft.; for loose cattle, 35 sq. ft.; for horses, including alleys, 75 to 90 sq. ft.; for milk cows, including alleys, 60 to 70 sq. ft.

The length of manger or width of stall required per head may be estimated as follows: For sheep, 15 in.; for loose cattle, 24 to 30 in.; for horses, in single stalls, 5 ft., in double stalls, 4 ft. 3 in.; for milk cows, 3½ ft. to 4 ft. Also see page 43.

The height of ceiling required in barns as far as the health and convenience of the stock is concerned is as follows: For sheep 8 ft. 10 in.; for loose cattle, 8 ft.; for horses, 8 ft. 6 in.; for milk cows, 8 ft.

The Louden Machinery Co.,
 St. Paul, Minn.

Gentlemen:

When we decided to build a barn to house our pure bred Holsteins, we were determined to have one that was efficient in every way. To aid us in this we consulted the Architectural Department of The Louden Machinery Company. In conjunction with this department, we worked out what we consider a very complete, permanent, convenient and sanitary building.

A profitable producing and breeding herd of dairy cattle must be comfortable and contented at all times. This means roomy stalls, accessible to water at all times, comfortable swinging stanchions, and well lighted and ventilated quarters.

We find Louden goods of excellent quality, of practical design—a tremendous labor-saver, and Louden Service unparalleled.

Very truly yours,

MINNESOTA HOLSTEIN COMPANY.
 By V. S. Culver, Sec'y-Manager.

Austin, Minn., Dec. 10, 1919.

Concrete Block Construction

It is recommended to use a mixture, for the facing, of 1 part cement and 2 parts sand; and for the balance of the block, 1 part cement, 2 parts sand, and 3 parts gravel, in which the pebbles for the gravel do not exceed $\frac{5}{8}$ inch diameter.

The materials required to prepare 1 cubic yard of mixture is approximately 6.16 sacks of cement, 0.47 cu. yd. of sand, and 0.73 cu. yd. of gravel, being sufficient for 69 blocks.

For the manufacture of 100 blocks (8" x 8" x 16" size), there are needed 9 sacks cement, 0.68 cu. yd. sand, and 1.06 cu. yds. gravel. It is also estimated that two laborers of ordinary intelligence can do all the work required to make, and can with ease turn out 200 blocks a day. A common mason will lay one hundred 8" x 8" x 16" blocks per day.

To find the number of cement blocks required to a building, find the net superficial wall surface in sq. ft. (all openings deducted) and multiply by the following:

For blocks with 8" x 16" face multiply by 1.125

For blocks with 4" x 16" face multiply by 2.25

For blocks with 8" x 24" face multiply by 0.75

For blocks with 4" x 24" face multiply by 1.50

To find the cu. ft. of mortar required for laying various sizes of cement blocks, multiply number of blocks by the following:

For 8" x 8" x 16" multiply by .0275 cu. ft. mortar

For 8" x 10" x 16" multiply by .0341 cu. ft. mortar

For 8" x 12" x 16" multiply by .0411 cu. ft. mortar

For 4" x 8" x 16" multiply by .0229 cu. ft. mortar

For 4" x 10" x 16" multiply by .0284 cu. ft. mortar

For 4" x 12" x 16" multiply by .0342 cu. ft. mortar

For 8" x 8" x 24" multiply by .0366 cu. ft. mortar

For 8" x 10" x 24" multiply by .0458 cu. ft. mortar

For 8" x 12" x 24" multiply by .055 cu. ft. mortar

For 4" x 8" x 24" multiply by .0322 cu. ft. mortar

For 4" x 10" x 24" multiply by .0392 cu. ft. mortar

For 4" x 12" x 24" multiply by .0481 cu. ft. mortar

Louden Machinery Co.,

Gentlemen:

We are more than pleased with the Litter Carrier purchased of you. Don't see how we could get along without it. Have given it hard service since we installed it, but it is as good, practically, as new; no weak flimsy parts to your Carrier.

Your cow stanchions are certainly dandies. We have used your tools for twenty-five years and find no fault with them.

Yours truly,
Stephen Holtkamp,
Pilot Grove, Iowa.

Stone Construction

Stone construction is only recommended for farm buildings where the stone can be picked up on the farm by the farm help at odd times, or in case a stone exterior is preferred for architectural effects.

Stone walls must be quite thick to save the labor of dressing large stones down to suit the thickness of a thin wall; the thickness of the wall is generally determined by the size of the stone at hand rather than by the thickness required for strength. Eighteen and 24 inches are common thicknesses for stone walls.

Most any stone which does not absorb water is suitable for building purposes. A stone which absorbs water, will break to pieces when freezing while saturated with water, and should not be used except underground below frost.

There are no universally adopted rules for measuring stone masonry. The most satisfactory manner of measuring stone is by the **cubic yard**. To find the number of cubic yards contained in a wall or pile of stone, multiply the height by the width by the length and divide the product by 27.

To lay up one cubic yard of rubble stone work, it will require, on an average, about 0.35 cubic yards of mortar. The most satisfactory mortar for stone work is a mixture of equal parts of lime mortar and cement mortar. In making this kind of mortar, the lime should be slacked, then mixed with the required amount of sand, and this mortar stacked in a pile until it is to be used. All the lime mortar needed for the job may be mixed at one time, because it will not spoil if kept wet. The cement mortar must not be mixed until it is to be used, then, after mixing the proper amounts of cement, sand and water, the cement mortar should be thoroughly mixed with an equal amount of the lime mortar, and used at once by the mason. The amounts of material required would be as follows:

For 1 cu. yd. of stone work:

0.35 cu. yd. of mortar

For 0.35 cu. yd. of mortar:

0.175 cu. yd. of lime mortar, and

0.175 cu. yd. of cement mortar

For 0.175 cu. yd. of lime mortar:

0.194 bbl. (unslacked) lime, and

0.175 cu. yd. sand

For 0.175 cu. yd. of cement mortar:

1.75 sacks cement, and

0.175 cu. yd. sand

Notes: One barrel of unslacked lime will make 2.25 barrels of lime paste.

One sack of cement is estimated as one cubic foot.

For further information address our Architectural Department.

Hollow Tile Construction

Tile has many advantages over lumber as a farm building material, and the progressive farmers are taking advantage of this ideal material.

With the present price of lumber, it has been found in many localities that it is just as cheap to build a wall out of hollow tile as it is to build it out of wood. Building tile is now manufactured in most all parts of the United States out of local materials, which makes it a moderate priced building material.

All its advantages may be summed up in the two words: **safe** and **permanent**. It is safe against fire, in fact it is the most fireproof building material that has ever been invented. It is safe against the spreading of contagious disease, because it is non-absorbent and contains no nesting places for germs of any kind. It is a safe protection against the two extreme temperatures of summer and winter, because its insulating qualities keep the building cool in summer and warm in winter. It is safe against overloading, because it will withstand a tremendous pressure and the ordinary loads as used in farm buildings have no effect on it.

It is permanent, because it contains no organic or plant matter to decay, it requires no paint to protect it from the elements and, when properly made, it will absorb no moisture, which, when freezing, would disintegrate its particles.

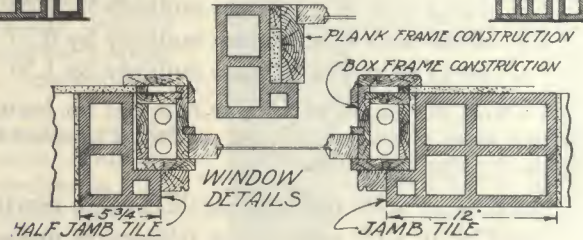
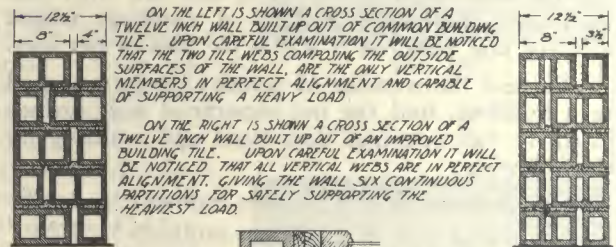
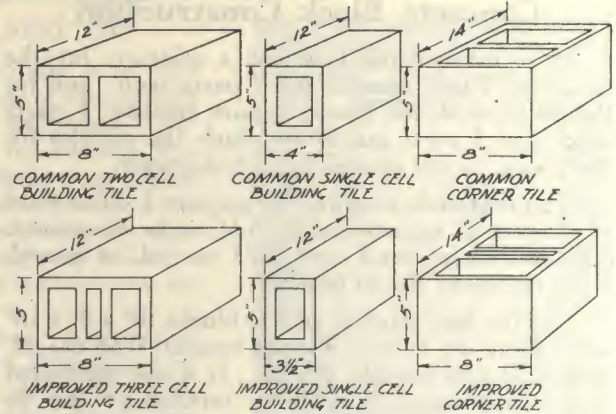
On account of tile being fireproof, it requires less insurance expense, and, because it needs no paint or other protection, it requires little expense for upkeep. From the fact that it makes a permanent wall, there is no depreciation in its value.

These facts about tile construction make its first cost the only cost and even if its first cost were quite a little higher than that of lumber, it would be the cheapest in the long run.

Like every other commodity on the market there are inferior and superior grades of tile, and for farm buildings, nothing but the best should be used. The tile selected for building purposes should be hard burned; they should have a clear ring when held suspended and hit with a hammer. A dry tile immersed in water for 24 hours should not increase in weight. Glazed tile as a rule are the best.

Any bricklayer or mason can successfully lay up a tile wall and the expense is much less than for laying brickwork, because the pieces are larger and the work progresses quite fast.

To find the number of various sizes of hollow tile blocks required for a building, find the net superficial wall area in square feet (all openings deducted), measuring all corners only once, then multiplying by the following:



- For 5"x8"x12" tile:
Multiply by 2.10 (8" thick wall)
- For 5"x4"x12" tile:
Multiply by 2.10 (4" thick wall)
- For 8"x8"x16" tile:
Multiply by 1.03 (8" thick wall)
- For a 12" thick tile wall, use 5"x4"x12" tile and 5"x8"x12" tile in equal numbers.
- For a 16" thick tile wall use two widths of 5"x8"x12" tile.
- To find the number required multiply net superficial wall area by 4.2.

To find the cubic feet of mortar required for laying tile in a 1/2" mortar joint, multiply the number of tiles that are to be laid, by the following:

- For 5"x8"x12" tiles:
Multiply by .041 cu. ft. mortar.
- For 5"x4"x12" tiles:
Multiply by .021 cu. ft. mortar.
- For 8"x8"x16" tiles:
Multiply by .057 cu. ft. mortar.

For a 12" or 16" thick wall where two widths of tile are used, the 1/2" vertical mortar joint in center of wall will have to be added to the above quantities. To find the cubic feet of mortar for this joint multiply the superficial wall area in square feet, where this joint occurs, by .0417.

For further information on tile construction address our Architectural Department.

Double Wall Construction

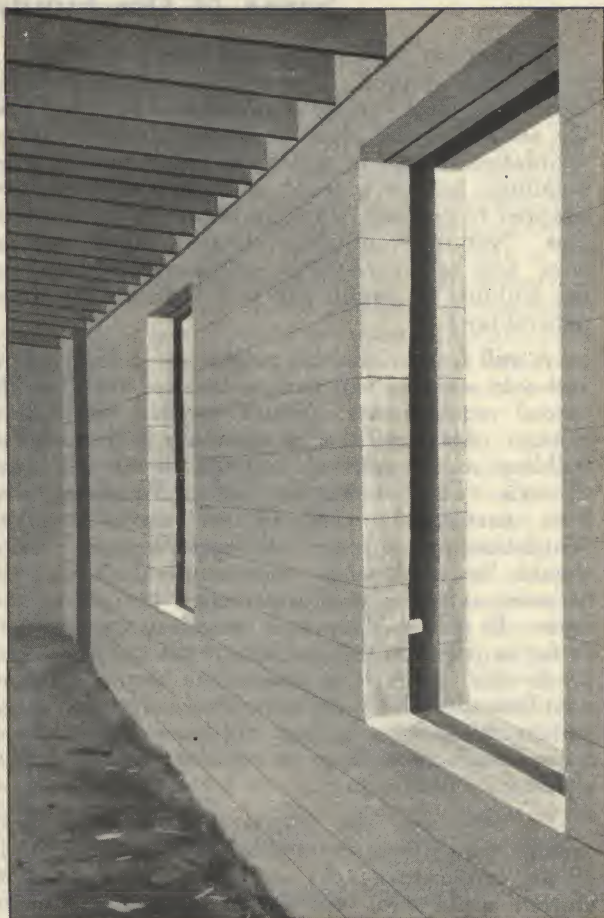
The last word in concrete construction and a method that applies itself very efficiently to the construction of farm buildings, is the double wall concrete construction. This consists of building two walls out of solid concrete, spaced several inches apart and securely anchored together with metal ties.

The advantages of this double wall construction are that it combines the strength of solid concrete with the insulation against dampness and undesirable temperature, obtained by the continuous and complete air space between the two walls.

Barns are built primarily for the protection of live stock against the heat of summer and the cold of winter; this protection is brought about through the insulating qualities of the walls, therefore the extent to which the wall can fulfil its mission of keeping the stock protected depends upon the resistance it offers against heat passing from one side of the wall to the other.

A dead air space between two walls offers the greatest resistance against temperature. For this reason, a tile wall is better than a solid brick, a concrete block wall is better than solid concrete and for the same reason, the double wall is better than either the tile or block, because both tile and blocks have connecting webs of solid material, which connect the outside face of the tile with its inside face, and these webs, as well as the mortar joints, conduct more or less heat from the warm side to the cold side of the wall; the amount conducted depending on the thickness and length of the web.

Reliable patent forms are now on the market for building this kind of wall which will, no doubt, make this superior construction very popular in the future.



In localities where sand and gravel can be procured for the hauling, this is no doubt the cheapest and quickest method of permanent construction.

Address our Architectural Department for further information.

A WORD ABOUT WATER BOWLS FOR COWS

The New Loudon Water Bowl represents the most definite improvement for individual indoor watering that has ever been offered you. It eliminates the bad features common in the ordinary water bowl and embodies many valuable improvements that belong exclusively to the Loudon Bowl. It is as nearly perfect mechanically as fine material and skilled workmanship can make it.



Figure 1—To release the bowl, it is only necessary to raise the nose piece to a vertical position.

The Loudon Bowl can be quickly and easily removed and completely sterilized—the two accompanying views show how this may be done—and, as a matter of fact, it is even twice as easy as it looks, yet it is so designed that a cow cannot budge it when in place.

Write us for information on this improved Bowl and we will gladly send you full particulars concerning it.



Figure 2—To remove the bowl and nose piece is but the work of a moment. It is done in a single operation.

Some of the Fundamentals of Ventilation

Ventilation may be divided into two classes—forced and natural. Forced ventilation requires blowers to force the air in or exhaust fans to draw the air out of the place to be ventilated. Forced ventilation is used in mines and sometimes in large buildings, but on account of its expense it is not adapted to ordinary dwelling houses or farm buildings. Natural ventilation depends upon natural laws, and all it requires is the arrangement of the building to permit the free operation of those natural laws.

A still further division might be made of warm and cold weather ventilation, because each has its special requirements. Warm weather ventilation is easy. About all that is necessary is to open the building so the natural currents of air will pass through. The Loudon Ventilating Windows have been particularly designed for warm weather ventilation, and meet all requirements. They should be used when the temperature outside becomes as warm or warmer than the air in the barn. In cold weather it is necessary to preserve, as far as possible, the warmth of the building, and to do this and at the same time secure efficient ventilation is the problem. The only absolutely perfect ventilation is out of doors where there are no walls or ceilings to interfere with the free movements of the air.

To overcome the interference of walls and ceilings, which are necessary to preserve the warmth of the building in cold weather, and secure the largest amount of ventilation obtainable under the circumstances, it is necessary that certain requirements be strictly complied with. To better understand these requirements it will be well to briefly consider the underlying principles governing air currents, and upon which ventilation is founded. Like everything else in nature, it is extremely simple when we once understand it, but extremely mystifying when we do not understand it. The "wind bloweth where it listeth" may seem to convey the idea that it is irresponsible or not subject to any definite rules of action, and yet there is nothing that is more instantaneously responsive to natural laws.

Heat and cold are the impelling forces behind every current of air. Heat expands and cold contracts air, as well as other things. The warm expanded air will be lighter than an equal volume of cold contracted air, and like the light boy on the teeter board, it will go up, while the cold air, like the heavy boy, will go down. The teeter board, however, is a clumsy illustration of the extremely mobile movements of the air currents. That cold air descends and rushes in to displace the heated air which ascends or is forced up, tells the story of all the air currents which have ever fanned the face of the earth, from the slightest zephyr to the

mightiest tornado. It is the **key-note** of all forms of ventilation.

Out of doors every discernible current of air, and also those not discernible, are simply never ending efforts of nature to preserve a uniform temperature. Out of doors the warmest place is at the ground, and as you go up the air becomes imperceptibly cooler until several miles high it becomes as cold as an Arctic winter, in warm as well as cold weather. This condition is natural, and is necessary to the continual purification of the air. Indoors the order is largely reversed. In a room having a stove and tight ceiling it is the warmest at the ceiling and the coldest at the floor. Sometimes the difference in temperature is as much as 20 degrees. Under such conditions, with the impurities of respiration and the carbonic acid gas generated by the stove retained in the room, the wonder is that colds and tuberculosis are not more frequent.

The problem is to preserve the warmth of the room in winter and at the same time to keep the air fairly pure and about as warm at the feet as at the head as it is out of doors and should be indoors.

Many systems of ventilation have been designed and quite a number give very good results. The most popular at the present time is the "King System" designed by Prof. F. H. King. This system is composed of air flues arranged according to the following order:

The King System

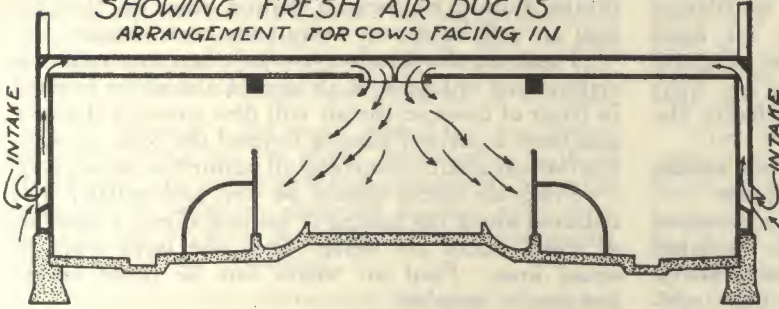
Fresh air flues are provided in the side walls; starting just high enough above the ground to keep snow from closing them up, they have intakes protected by a wire mesh to keep out birds and the flues run up to the ceiling to a damper located so the fresh air will enter the barn at the ceiling and always in front of the cows' heads.

Foul air flues should start on the inside near the floor and end in a flue above the roof. The air outside being colder and heavier than the air in the room, it will tend to rush in and replace the warmer and lighter air of the room, which will be forced through the outlets to mingle with the cold air above the roof.

The pure cold air coming in at the ceiling will mingle with the warmest air in the room, and will be warmed to a considerable extent before reaching the floor. By this means the air of the room will be purified but will not be chilled as much as it would be if it was admitted through an open door or window.

It may seem that on this arrangement there is a reversal of the natural law, that cold air descends and heated air rises, but it is only apparent, or, in other words, going a short distance backward to get around an obstacle and reach the desired end.

*CROSS SECTION OF BARN
 SHOWING FRESH AIR DUCTS
 ARRANGEMENT FOR COWS FACING IN*



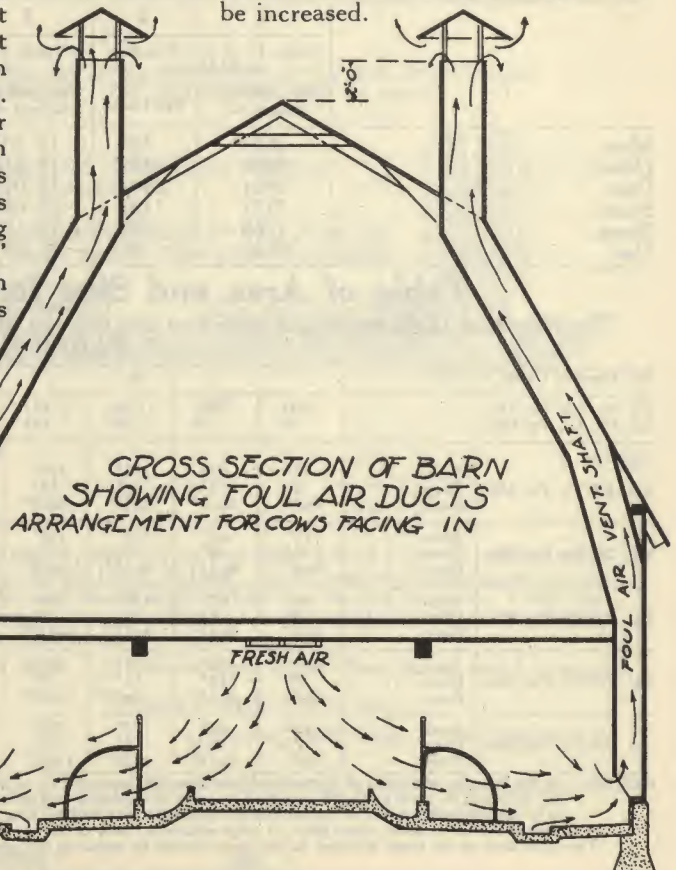
It is well known that water will rise in the short end of a siphon, apparently in opposition to the laws of gravitation, to go a further distance down in the long end of the siphon. These ventilating flues are constructed on the principle of an inverted siphon. The cold air will rise a short distance up to go a longer distance down, and the warm air will go a short distance down to get a greater distance up. The principle is the same as the teeter board, which sends the light boy up, apparently in violation of the laws of gravity, in order that the heavy boy may go down in obedience to the same law.

This arrangement to work successfully must be right in every respect. No person would go back around-about to get to a place if he could go straight ahead. The cold air will not go up in a flue to get in a building if it can get in below through an open door or window, or through cracks in the siding. Neither will the warm air go down near the floor to get out of the building if it can get out through the ceiling or through openings in the upper parts of the wall. Any cracks or crevices in the flues will also be detrimental. It is an old and a true saying that "A fountain will never rise higher than its head" but it is equally true that it will never rise that high unless compelled to do so. The air will never pass these ventilating flues if there are more direct ways for it to go. There should be no abrupt shoulders or corners in the flues to obstruct the passage of the air, and the air should be enough warmer and lighter in the building than outside to cause it to travel the round-about way through the ventilating flues. When the temperature inside and out is about the same, this system of ventilation will not work, because there is not enough difference in the weight of the inside and outside air to force the round-about passage it has to take.

In dairy barns where no artificial heat is used and where the difference in temperature will not be so great, it is even more important to have everything just right. Especial care should be taken to have the barn built as close and as warm as possible, to make these ventilating flues

work to the best advantage. If the lower parts of the outlet flues were made of sheet iron so there would be no danger of fire, and gas jets were placed in them, it would help to create the draft necessary to make the strongest current. This would be especially advantageous in the early spring or late fall months when there is but little difference in the temperature of the air inside and outside the building. During the warmer months these ventilating flues will be but little use, and a more direct system of ventilation should then be used.

One of the worst things to be contended with in dairy barns during the winter months is the humid state of the atmosphere and its condensation on the walls and ceiling of the building. This is due to a lack of proper ventilation, and is aggravated by the lack of proper insulation. Warm air will carry a larger amount of moisture than cold air, and when it is brought in contact with a cold surface the moisture will be precipitated, and will form in drops of water on the ceiling and on the walls. A warm barn with an active circulation of the air through the ventilating flues is the best thing for this condition. There is a lot of moisture in the cows' breath, and when the ventilating currents are sluggish and the temperature is chilly, this "sweating process" will be increased.



*CROSS SECTION OF BARN
 SHOWING FOUL AIR DUCTS
 ARRANGEMENT FOR COWS FACING IN*

Open doors and windows cannot be used at the same time with the ventilating flues, because the interchange of air currents will take place through the doors and windows instead of the ventilating flues, because the air will always take the most direct course. If the ventilating flues are properly arranged and proportioned (the nearer air tight the building is, the better) the more perfectly the ventilation will work.

The essential points required for perfect results with this system of ventilation are as follows:

The room must be as near air tight as is practical to make it. Walls and ceiling should be insulated from outside temperature by lining with heavy building paper, matched lumber or other non-conducting material. The foul air vent shafts must start near the floor and run up at least two feet above highest point of roof. Should be smooth on inside. Can be changed from oblong to square or round, but area must remain the same the entire length. It should be as near vertical as possible

and avoid all sharp bends and horizontal runs. It should be air tight and insulated from outside temperature. Should have rain proof top, and intake should be located behind cows so that all foul air will be drawn away from cows' heads.

Fresh air should always enter the room near the ceiling, and entrance of air should always be located in front of cows so the air will flow towards the cow and form a current passing beyond the cow, towards the foul air shaft, absorbing all impurities in its path.

Fresh air ducts should be well and equally distributed along the ceiling of feeding alley; a number of small ducts are better than one large duct of equal area. Foul air vents can be made larger and less in number.

Foul air vent ducts take up least amount of room and are cheapest to build if built into the outside walls as shown in sketch on page 29, and fresh air ducts can be run to center of ceiling (between joists) as well as not. For this reason we recommend cows be stanchioned facing in.

Table of Fresh Air Supply and Ventilation

Prof. F. H. King has computed the amount of pure air which must be breathed to supply the oxygen needed by different animals, as shown in the following table, and we have added the last two columns, which show the area of vent flues that are required per head for a current of air flowing through the vent flues at the rate of 295 feet per minute, and 200 feet per minute, respectively.

If the vent flue is less than 30 feet in height, column 7 should be used, and if over 30 feet high, column 6 may be used:

TABLE No. 10

	1		2		3		4		5	6		7	
	Cubic ft. of Air Breathed in 24 Hours		Pounds of Oxygen Consumed in 24 Hours		Cu. ft. Air Supply Per Hour Per Head		Flue Area Per Head Air Flowing 295 ft. per min. Inches			Flue Area Per Head Air Flowing 200 ft. per min. Inches			
	Per 1000 lbs. Animal wt.	Per Head	Per 1000 lbs. Animal wt.	Per Head									
Man	2833	425	12.207	1.831	537	4.22	6.43						
Horse	3401	3401	13.272	13.272	4296	34.84	51.55						
Cow	2804	2804	11.04	11.04	3542	28.80	42.48						
Swine	3753	1103	29.698	4.456	1392	11.38	13.12						
Sheep	7260	726	29.314	2.931	917	8.35	10.94						
Hen	9667	29	23.84	.075	35	.28	.43						

Table of Area and Size for Vent Flues in Inches

The following table shows the area and size of vent flues required for dairy cows:

TABLE No. 11

No. Head of Cows.....	1	2	4	6	8	10	12	14	16	18	20
Cu. Ft. Air, Per Hour.....	3542	7084	14168	21252	28336	35420	42504	49588	56672	63756	70840
Cu. Ft. Air, Per Min.....	59	118	236	354	472	590	708	826	944	1062	1180
Velocity											
Vel. 300 Ft. Per Min.	Area..... 28"	57"	113"	170"	226"	283"	340"	396"	453"	509"	566"
	Diam..... 6"	8 1/2"	12"	15"	17"	19"	21"	22 1/2"	24"	25 1/2"	27"
	Rect..... 4x7"	6x10"	8x13"	8x22"	11x22"	13x22"	16x22"	18x22"	21x22"	23x22"	26x22"
Vel. 275 Ft. Per Min.	Area..... 31"	62"	123"	185"	247"	308"	370"	432"	494"	556"	618"
	Diam..... 6 1/2"	9"	12 1/2"	15 1/2"	17 1/2"	20"	22"	23 1/2"	25"	27"	28"
	Rect..... 4x8"	6x11"	8x16"	9x22"	12x22"	14x22"	17x22"	20x22"	23x22"	25x22"	28x22"
Vel. 250 Ft. Per Min.	Area..... 34"	68"	136"	204"	272"	340"	408"	476"	544"	612"	680"
	Diam..... 7"	9 1/2"	13"	16 1/2"	19"	21"	23"	25"	26 1/2"	28"	29 1/2"
	Rect..... 6x6"	6x12"	8x17"	10x22"	13x22"	16x22"	19x22"	22x22"	25x22"	28x22"	31x22"
Vel. 225 Ft. Per Min.	Area..... 38"	76"	151"	227"	302"	378"	453"	529"	604"	680"	755"
	Diam..... 7 1/2"	10"	14"	17"	20"	22"	24"	26"	28"	29 1/2"	31"
	Rect..... 6x7"	6x13"	8x19"	10x22"	14x22"	17x22"	22x22"	25x22"	28x22"	31x22"	35x22"
Vel. 200 Ft. Per Min.	Area..... 42"	85"	170"	255"	340"	425"	510"	595"	680"	765"	850"
	Diam..... 7 3/4"	10 1/2"	15"	18"	21"	23 1/2"	25 1/2"	27 1/2"	29 1/2"	31 1/2"	33"
	Rect..... 6x7"	6x14"	8x22"	12x22"	16x22"	20x22"	24x22"	28x22"	31x22"	35x22"	39x22"

NOTES:—As the framing members of frame barns are generally spaced 2 ft. on centers (about 22" apart) the flue sizes are as much as possible confined to 22" in width to work out with standard spacing of studding and rafters.

It is not advisable to serve more than 20 cows with one foul air flue.

It is not advisable to serve more than 5 cows with one fresh air flue.

The total area of the fresh air flues in the room should be equal to the total area of the foul air flues, as listed in table N o. 11.

A Few Points on Insulation

The ventilating and heating of buildings are closely related subjects, in fact most all ventilating systems depend on a difference in temperature for their successful operation. A room that is well insulated against cold can, therefore, be more perfectly ventilated without sacrificing all of its heat.

For example, a hot vessel closed up in a fireless cooker will stay hot for hours, because the walls of the cooker are so constructed (insulated) that the heat of the vessel is absorbed by the walls very slowly, and because the compartment containing the vessel is not ventilated.

If the lid of the cooker were left open, the vessel would soon cool, because it would have perfect ventilation. These same principles apply to a barn containing live stock.

To maintain good ventilation in a heated room, it is necessary to sacrifice a certain amount of the heat that is constantly being generated. The amount of heat required to keep a room warm in addition to that sacrificed in the ventilation depends on how fast the heat is absorbed by the cold floor, ceiling and walls enclosing the room.

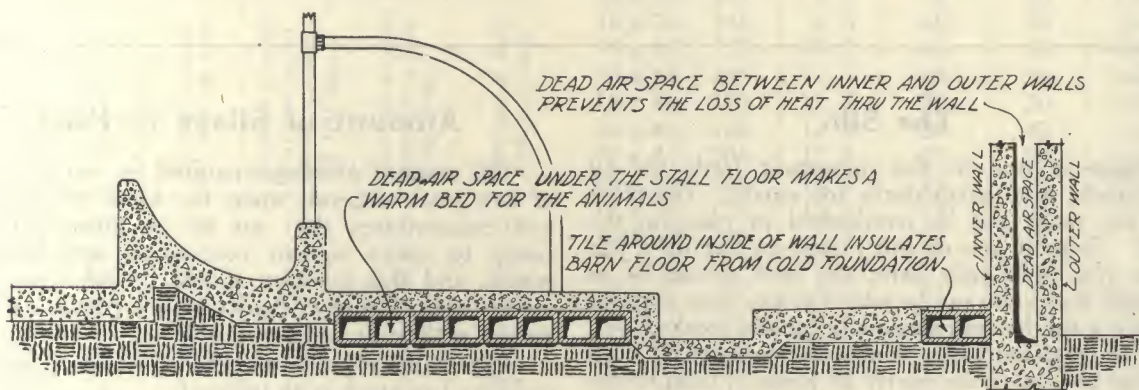
Too much attention can not be given to the insulation of the walls, ceiling and floor of the room

housing the live stock. The fuel you feed your stock to keep the barn warm is expensive, and if the dairy cow must convert all her food into animal heat, she can not do justice to the milk pail; and if the hogs must convert all their feed into animal heat, they can not put on additional weight.

The best insulating substance that can be applied to building construction is dead air. The dead air cells between the fibers in wood is what makes an inch of wood more effective than twelve inches of stonework in keeping the barn warm. All materials containing air make good insulation; felt, paper, straw and sawdust are good examples.

For permanent wall construction, the double wall with air space between gives the best insulation; hollow tile or concrete blocks are better than solid brick, stone or solid concrete. Existing solid masonry walls may be insulated by furring the surface with wood strips and covering these strips with matched lumber, lath and plaster or other wall material.

Stall floors may be insulated by placing the floor on top of hollow tile as shown by the accompanying cut or by placing cork brick on top of the cement floor, as shown by the cut on page 4.



Louden Machinery Company,
Gentlemen:

I have been using your equipment in my certified dairy barn for about six months and have put it to the test every way we knew how, but find everything stands the test and should last a lifetime. Every part of the equipment is perfectly satisfactory and comes up to the standard that every one should expect when he is buying the best. I find that I can keep a herd of cows in shape to produce certified milk cheaper with the Louden equipment than I could keep cows in the old fashioned way for producing the cheapest grade of market milk.

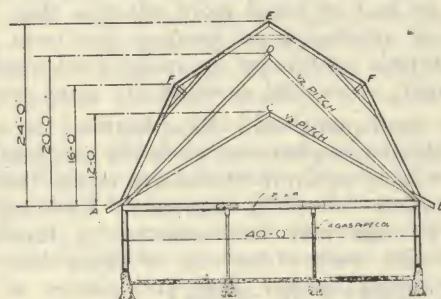
I might state that I am in the dairy business for the dollar. My equipment ran into four figures and I count it the best spent money I put into my dairy barn.

BLAIR B. HILEMAN, Prop.,
Pleasant Valley Stock Farm, Altoona, Pa.

Placing a row of hollow building tile between the outside wall and the concrete floor so the top of tile will be flush with the floor or just below the top dressing of the cement, will be a great help in keeping the floor warm; it breaks the contact between the cold outside wall and the floor.

About Barn Roofs

The accompanying illustration shows three ordinary roofs. The third pitch was the old style used almost universally a hundred years ago, shown



Three Common Pitches of Roofs

at C. This gives mow room 12 feet deep at the peak above the plate line in a barn 40 feet wide. The half pitch roof shown at D gives 20 feet mow room in the center above the plate, while the roof shown at E gives a height of 24 feet in the center

and 16 feet at FF. It will readily be seen that the value of such a roof is very much greater than either straight roof when it comes to storage capacity.

Besides the advantage of increased storage, the larger roof is right when it comes to turning water. The upper part is not very steep. The upper roof is short and it is not necessary that it should be steep, because there is very little accumulation of water. The lower portion of the roof drops away quickly. This is exactly the reverse of the old style lean-to, where the addition sloped away and held a large amount of water to rot the shingles.

The advantage of a double roof pitch was never appreciated until hay forks came into general use to put hay and sheaves up into the loft in such quantities and so quickly that considerable storage room was found necessary in which to mow it away. Then again, it requires from 8 to 10 feet headway to use a hay fork to advantage. In figuring the capacity of the different shaped roofs this fact should be taken into consideration.

It costs a little more to build a double roof, but the extra cost is not in proportion to the extra value. Then, for a finish to a modern barn, nothing will equal in appearance one of the double or Gambrel roofs when well built and rightly proportioned.

The Silo

Amount of Silage to Feed

Silage is one of the important feeds for all live stock, and particularly for cattle. Therefore the silo must not be overlooked in planning the barn. Even if you do not intend to put up a silo when you build your barn, the barn should be so planned that a silo can be added at any time without changing the feeding scheme originally worked out.

The National Dairy Magazine states that, "Silage can be made from nearly all kinds of farm forage and is a good and cheap ration for horses, cattle, sheep, swine and chickens. It requires little storage space, is a labor-saving device, doubles the value of the corn crop, triples the stock carrying capacity of the land, restores the fertility of the soil and returns its user annually 100 per cent on the investment."

The size of the silo must be carefully estimated so there will be a sufficient amount of silage taken off each day to keep it fresh, as it spoils very quickly when exposed to the air. From one and one-half to three inches of silage should be taken off the top surface each day.

Silage must be fed while it is fresh from the silo, it is not safe to feed silage which has started to mould to any kind of stock, and especially to horses.

The amount of silage required for various kinds of live stock depends upon the kinds of roughage and concentrates that are to be given with the silage to make up an economical and balanced ration, and this question should be taken up with your local County Agricultural Agent, who is versed with your local conditions.

Approximately the amount of silage consumed daily by live stock is as follows:

For dairy stock: Cows in full milk, 30 to 50 pounds; dry cows, 20 to 30 pounds; heifers, 15 to 20 pounds.

For beef cattle: Breeding cows, 30 to 40 pounds; two-year-olds, 30 to 40 pounds; calves and yearlings, 15 to 30 pounds; fattening cattle, 25 to 30 pounds; first stage fattening, 25 to 30 pounds; middle stage fattening, 15 to 20 pounds; last 40 days, 10 to 15 pounds.

For horses: Brood mares, 20 to 30 pounds; idle horses, 15 to 20 pounds; idle yearlings, 10 to 15 pounds.

For sheep: Breeding ewes, 3 to 4 pounds; fattening lambs, 2 to 3 pounds; fattening wethers, 3 to 4 pounds.

Silo Construction

We will not undertake to discuss as to how a silo should be built, because there are such a great number of silos on the market made by experienced manufacturers along efficient lines that it would not pay any farmer to build a silo after his own ideas. There is no question but what the cylindrical shape is best.

The most common types of silos are constructed of wood stave, concrete block, cement stucco on fabricated metal, double wall concrete, laminated wood, etc. The manufacturers and builders of these various silos furnish complete information and directions for the erection of their silos.

The working plans we furnish for barns show the size and location we would recommend for the silos, but do not include plans and specifications for their construction.

Size of Silo Required

Table No. 12 gives the amount of silage that can be stored in various sized silos, the correct diameter for different sized herds, the amounts to feed daily and the acreage of land necessary to fill it.

TABLE No. 12

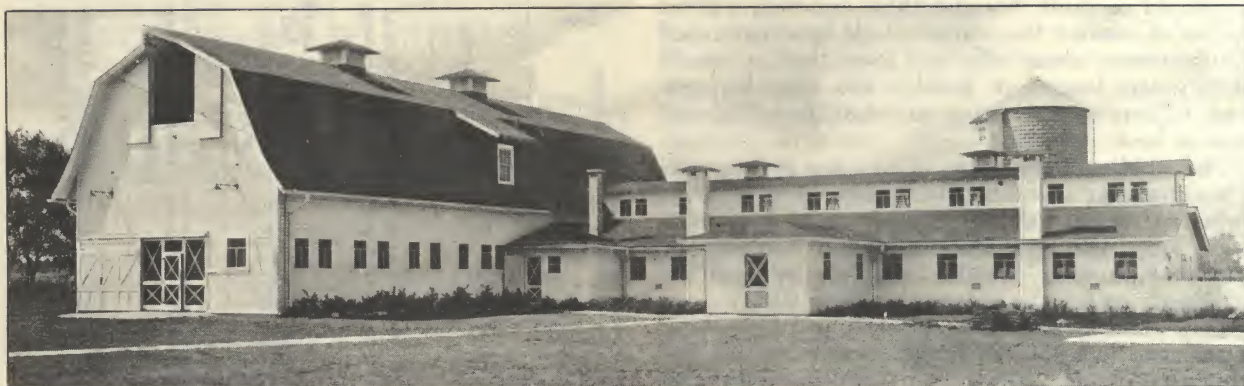
Note: The sizes we would recommend under average conditions are those printed in heavy type.

Size		Tons Capacity.	Acres of corn at 15 tons per acre.	Number of cattle that can be fed 40 lbs. per day for 180 days.	Number of cattle required to keep silage fresh.	Amount of daily feed in pounds.
Diameter	Height.					
10 x 20	30	2.0	8	8	525	
10 x 22	33	2.2	10	8	525	
10 x 24	35	2.3	11	8	525	
10 x 26	38	2.5	12	8	525	
10 x 28	41	2.7	12	8	525	
10 x 30	46	3.0	12	8	525	
10 x 32	51	3.4	14	8	525	
10 x 34	56	3.7	16	8	525	
10 x 36	61	4.0	16	8	525	
10 x 38	66	4.4	18	8	525	
10 x 40	71	4.7	19	8	525	
12 x 20	41	2.7	12	12	755	
12 x 22	46	3.0	12	12	755	
12 x 24	51	3.4	14	12	755	
12 x 26	56	3.7	16	12	755	
12 x 28	61	4.0	16	12	755	
12 x 30	67	4.4	18	12	755	
12 x 32	73	4.8	20	12	755	
12 x 34	79	5.2	22	12	755	
12 x 36	86	5.7	25	12	755	
12 x 38	93	6.2	27	12	755	
12 x 40	100	6.6	29	12	755	

TABLE No. 12—Continued

Size		Tons Capacity.	Acres of corn at 15 tons per acre.	Number of cattle that can be fed 40 lbs. per day for 180 days.	Number of cattle required to keep silage fresh.	Amount of daily feed in pounds.
Diameter.	Height.					
14 x 20	60	4.0	16	15	1030	
14 x 22	66	4.4	19	15	1030	
14 x 24	72	4.8	21	15	1030	
14 x 26	80	5.3	23	15	1030	
14 x 28	86	5.7	25	15	1030	
14 x 30	91	6.0	27	15	1030	
14 x 32	100	6.6	29	15	1030	
14 x 34	109	7.2	30	15	1030	
14 x 36	118	7.8	33	15	1030	
14 x 38	128	8.5	38	15	1030	
14 x 40	138	9.2	40	15	1030	
16 x 20	70	4.6	20	20	1340	
16 x 22	78	5.2	21	20	1340	
16 x 24	87	5.7	25	20	1340	
16 x 26	97	6.4	26	20	1340	
16 x 28	108	7.2	30	20	1340	
16 x 30	119	7.9	34	20	1340	
16 x 32	131	8.7	38	20	1340	
16 x 34	143	9.5	40	20	1340	
16 x 36	155	10.3	44	20	1340	
16 x 38	167	11.1	48	20	1340	
16 x 40	180	12.0	51	20	1340	
16 x 42	192	12.8	56	20	1340	
16 x 44	204	13.6	60	20	1340	
16 x 46	216	14.4	71	20	1340	
16 x 48	228	15.2	74	20	1340	
16 x 50	240	16.0	77	20	1340	
18 x 20	92	6.1	27	25	1700	
18 x 22	101	6.7	29	25	1700	
18 x 24	112	7.5	30	25	1700	
18 x 26	124	8.2	34	25	1700	
18 x 28	137	9.1	40	25	1700	
18 x 30	151	10.0	44	25	1700	
18 x 32	166	11.1	46	25	1700	
18 x 34	181	12.0	51	25	1700	
18 x 36	196	13.0	54	25	1700	
18 x 38	212	14.1	60	25	1700	
18 x 40	229	15.2	64	25	1700	
18 x 42	246	16.4	70	25	1700	
18 x 44	264	17.6	75	25	1700	
18 x 46	282	18.7	78	25	1700	
20 x 40	281	18.7	80	35	2100	
20 x 42	300	20.0	89	35	2100	
20 x 44	320	21.3	89	35	2100	
20 x 46	340	22.6	100	35	2100	
20 x 48	361	24.0	103	35	2100	
20 x 50	382	35.4	110	35	2100	

Planning the Dairy Barn



It is not economical to build a dairy barn with just one row of cows, even for a small herd, because the barn with one row of stalls requires just as much side wall construction as a barn with two rows of stalls. The barn with the single row is also much harder to keep warm in winter, because the exposed wall surface is so much greater per animal than where the two rows of stalls are placed in the same room.

Some dairymen having large herds have built their barns wide enough to stable four rows of cows in the width of the barn, so as to save still more side wall surface per head and also to save labor by having one less alley floor to clean. But while it is true that the wide barn saves side wall construction, the extra construction required to support the wide roof exceeds the saving made in the side walls.

The two rows of cows near the center of the four row barn are so far away from the windows that they do not get the proper light and air. There is no way of getting sunshine to the center of the barn for proper disinfecting and the ventilation problem is a difficult one.

Taking all into consideration, we recommend the two row barn where you have a set of windows for each row of cows, with uniform conditions for all the stock.

The question as to whether it is best to place the stock facing in or facing out still remains an open discussion among the most experienced and successful dairymen. Each way of facing the stock seems to have some good advantages and it depends upon each individual dairyman to decide which feature he considers most important.

Some arguments advanced in favor of facing the stock out are: That the work of cleaning is more convenient; that if milking machines are used, one man can watch machines in both rows at the same time; that all cows will leave and enter the barn at one door.

Some of the arguments advanced for facing the cows in are: That the feeding is more convenient; that the animals will be more contented if they can see each other; that the foul air flues can be placed

more directly behind the cows where they will be most effective in taking out the foul air; that the sunshine entering the windows will reach the gutter, the foulest part of the floor, keeping it disinfected; that if facing out, the stock would have their eyes in the sunshine.

Under ordinary conditions, we would prefer the cows facing in, but this should not influence the beginner unduly. It is best to visit barns of both arrangements before making any definite decision.

THE ADVANTAGES OF A WELL PLANNED BARN

The primary feature of a well planned dairy barn is its provision for cow-comfort. Practical tests have proved conclusively that the cow's physical comfort is a big factor in her milk yield.

The well planned dairy barn has a ventilating system that **ventilates**. The number and areas of vent flues necessary are scientifically determined. The window area is carefully calculated, according to the number of animals to be housed. Floors, mangers, and gutters are designed for durability and cleanliness. The cows are provided with light, airy stalls that give them utmost freedom and comfort.

The well planned barn is convenient for the workmen, as well as comfortable for the cows and other live stock—an extremely important feature where help is scarce and high priced.

It is so designed and equipped that no labor is lost. The silo is located where it is convenient for feeding, as well as for filling. The feed bins are located where they can be reached with the fewest number of steps. The manure pit is located, if possible, so that it is not necessary to push a load uphill. The barn is equipped with labor-saving appliances that increase the profits derived from it, and transform barn drudgery to pleasant labor.

Some Practical Standard Arrangements

During our long experience of barn designing, we have noted the progress and development of modern farm buildings, and have given just as much thought to the practical arrangements of farm buildings as to their construction. And, after comparing about 10,000 plans made up in accordance with the particular requirements of as many farmers, it is found that certain features of arrangement are so common and practical for average farm conditions that these features may be considered standards of arrangement.

By properly combining these standard features, several arrangements have been worked out which may be termed standard arrangements, because they are typical of the average and common needs of the American farmer, and cover all the desirable features of an efficient barn.

In working out these arrangements, each labor operation required in and about the building in the handling of the live stock, feed, bedding, manure, milk, tools, etc., has been carefully studied from the farmer's point of view, with the idea of saving steps, labor and time in doing the chores; just as our factory efficiency engineer calculates the routing of parts and location of machines for largest and most efficient production.

We would recommend these standards in preference to other arrangements that may be shown in this book because we believe them to be the last word in barn arrangements, and you would find a barn built after these standards most practical.

Any of the standard arrangements may be combined with any of the standards of construction as shown on pages 11 to 20 inclusive.

A separate standard has been worked out for each type of barn and these have been indexed in alphabetical order. Standard arrangement Type "S" is below illustrated:

We do not recommend building combination barns. It is **best** to have the dairy stock in a separate building from the horses and other stock on the farm. The combination barns herein shown are recommended only where it is found necessary for obvious reasons to combine the horse and dairy stock under one roof.

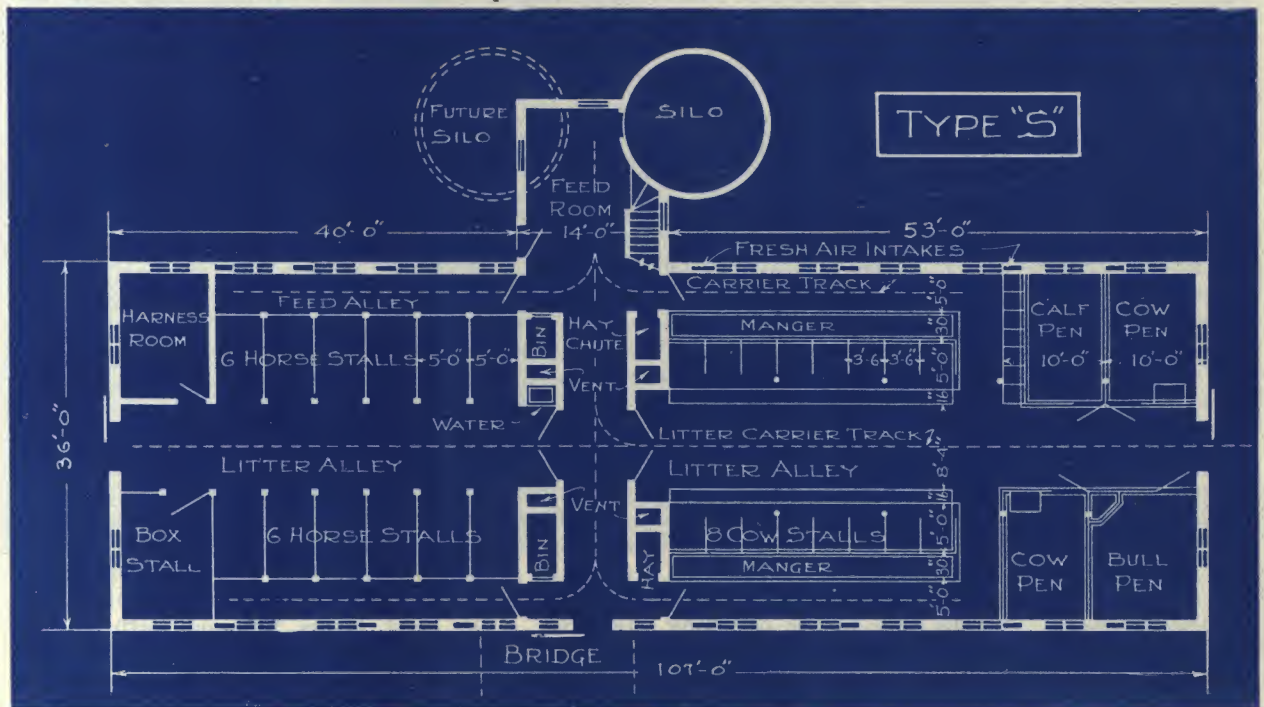
Standard Types of Barns

We have developed four types of barns, which fulfill the requirements of a great majority of farms. Two of these, types "S" and "T," are for combination barns and two types, "U" and "V," for dairy barns.

Combination Barns Type "S"

This standard arrangement Type "S" is for a combination horse and dairy barn with the stock facing out.

Upon examining this plan, you will notice that the barn is divided into four parts or divisions, which may be called horse division, feed division, cow division and pen division, and are explained as follows:



Feeding Division: The feed division is placed in the central part of the barn, so it will be most convenient to the stock. The horses are not always fed at the same time when the milk cows are fed and their feeds are not alike, so the feed room should be located convenient to both and the logical place is between the two sections.

Another reason for locating the feed division in the central part of the barn is because the future development of the farm may demand additional barn room for horses or for cows, and with the feed room in the center, it leaves both ends of the barn free for future extension to increase its capacity without interfering with the established feeding routine. In this location, it also acts as a vestibule or hall between the cow division and horse division, so that any dust or odors from the horses will not enter the cow division during milking time. Entering the milking room through the feed room prevents a direct current of cold air from coming into the portion of the barn housing the cattle.

The feed room is extended out beyond one side of the barn so as to connect direct with the silo. This puts the silo at the side of the barn in place of at the end so that both ends of the barn remain free for future extensions.

The feed room contains two hay chutes which start in the upper part of the hay mow. These chutes have doors down one side in the mow similar to a silo chute, except that the chute and doors are necessarily larger and must run down to the feed room floor and have a door at one side below for taking out the hay. The chutes built dust tight will eliminate much of the dust experienced with the common type of chutes that stop at the ceiling. Their location places the hay door directly at the end of the cow mangers where it is most convenient. The closed chute will also prevent any heat that may accumulate in the feed room from escaping into the mow.

A bin for oats or other feed is conveniently located opposite one of the hay chutes and a watering trough opposite the other hay chute for the horses. This feed room is large enough for grinding and mixing and large storage bins for grain or mill feed may be built directly over the feed room of any size desired. These may be built with a hopper bottom so the feed can be spouted down to the feed carrier or grinders.

In case this plan is to be used for a basement or bank barn, the approach to the mow floor may be located where shown by the dotted lines marked "Bridge." In this location the driveway would come along one side of the hay chutes, which would have a tendency to keep the hay from falling over into the driveway. A trap door in the driveway floor located directly over the oats bin will admit dumping the feed directly from wagon into the bin.

In case of a driveway in the mow, the storage bins for mill feed and grain could be located between the hay chutes. The stairway located as shown on the plan would land at the head of the driveway.

Horse Division: This division is shown at the left-hand end of the plan, its location admits bringing the horses in at the end of the barn. Stalls are arranged on both sides of the center alley and they face the two feeding alleys which are entered from the feed room.

The length of this division may be made to suit any desired capacity, a space of 5 feet should be allowed for each single tie stall, 8 feet 6 inches for each double tie stall and 9 to 12 feet for each box stall. Table No. 13 on page 40 will give the length required for the horse division for various capacities using single tie stalls and a few box stalls. A space equal to one of the box stalls in size may be used for a harness and tool room as shown on the plan.

Cow Division: This division is shown at the right hand of the feed division on the plan. In case the location of the barn permits, it is advisable to build the barn with the ends to the north and south; placing the cow division to the south of the feed division. With this location, the morning sun will enter the east windows and in the afternoon the west windows, giving a certain amount of sunshine to all parts of the room some time during the day. The room is arranged for two rows of cow stalls facing out and all the stock enters by the large double doors at the end of the center litter alley.

Foul air flues are provided at the end of the stall gutters, which have a large opening near the floor and follow the hay chutes through the mow and continue through the roof to the ventilators. Fresh air flues are located in the side walls, between windows, distributing the fresh air along the ceiling of the feeding alleys so it will drop down in front of the cows. An overhead trolley track for feed and litter carrier system may be installed as shown by the dotted lines, which will very much reduce the labor of feeding and cleaning.

The length of this division may be built to suit the capacity desired and it may be increased at any future time by building an extension to the end of the barn. For the length required for various number of cows, see the table No. 13 on page 40.

Pen Division: For dairy farming on a large scale, we do not recommend placing the dry stock, bulls, calves and heifers in the same room with the milk cows. In fact it is best to have them in a separate building. Even for smaller herds it is advisable to keep the dry stock separate so as to keep the milking room as clean and sanitary as possible. On most farms, the old barn is remodeled for the dry stock when a new modern dairy barn is built; this is good economical practice.

The pen division, as illustrated in these standard types of arrangements, is our suggestion for pen arrangements in case it is found advisable to place the dry stock in the same barn with the milk cows. A solid partition (not shown in cut) which could be placed between the cow division and pen division is preferred.

The length of the pen division may be built to various capacities, we would recommend a space of 7 to 10 feet for the width of each calf pen; 8 to 10 feet for the width of each cow pen; and 10 to 14 feet for the width of each bull pen. One central alley is all that is required in the pen division; the pens extending back to the side walls give the animals more freedom and admit of most economical construction.

Standard Arrangement Type "T"

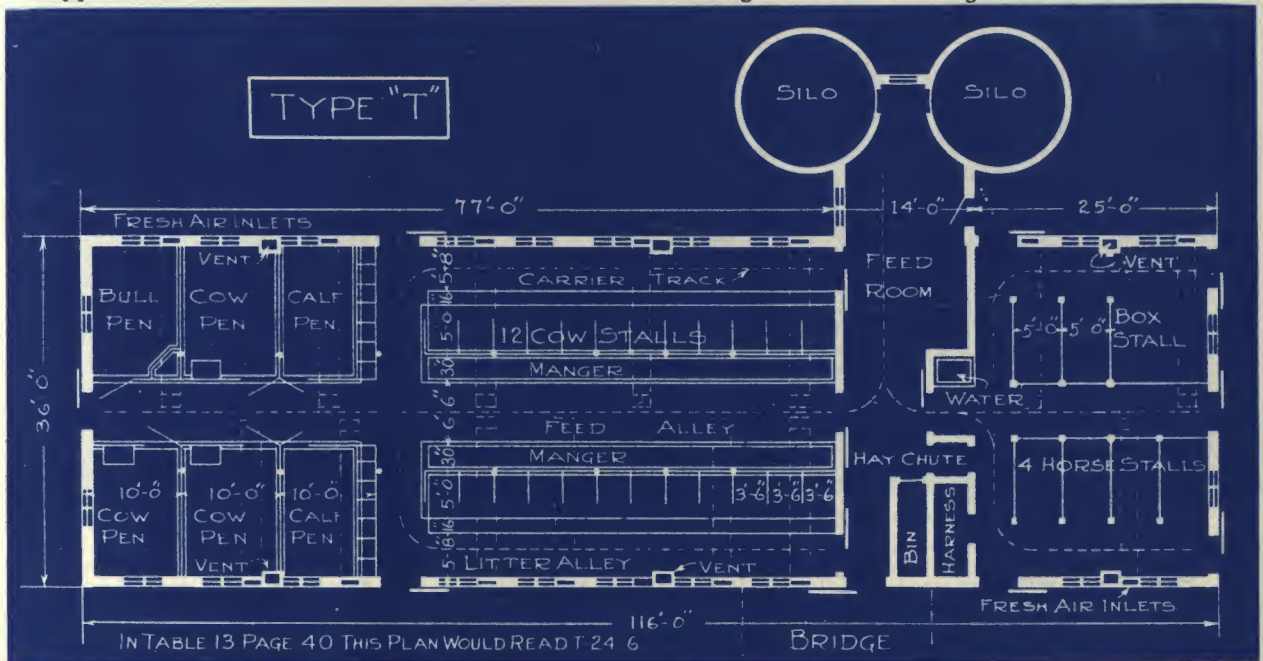
Standard arrangement Type "T" is for a combination horse and dairy barn with the stock facing in. The illustration of this arrangement shows that the barn is divided into a feeding division, horse division and cow division, similar to Type "S".

The feeding division is also centrally located and has the same advantages as explained for Type "S" on pages 37 and 38. One or two silos may be built at the end of the feed room as the case may require, and, placing the feed bin at the end of the feed room, it can be filled from the outside or from the top in case a driveway is built up to the mow floor.

The horse division contains two rows of single stalls facing a center feed alley, and box stalls may be placed at one end if desired. A closet for harness and tools is cut out of one corner of the feed room and a watering trough located near the feed room door is convenient from both rows of stalls.

The pen division may be built to suit the requirements or may be omitted in case it is found advisable to house the dry stock and young stock in another building.

If this type is to be used for a basement or bank barn, the driveway to the mow floor may be located where shown by the dotted lines marked "Bridge." The mow floor can be arranged with storage bins adjacent to the hay chute at one side of the driveway, and a trap door in the driveway floor for dumping feed from a wagon directly into the feed bin below. The stairway lands at the head of the driveway, where it will be most convenient for reaching the storage bins, hay chute, etc. Every detail of this plan has been developed with the idea of saving labor in the caring for the live stock.



Types "S" and "T" can be adjusted to meet the requirements of almost any farm by changing the length of the pen, cow, and horse sections to accommodate the desired number of stock.

Table 13 on page 40 gives a list of possible sizes and capacities for these two types.

Index Designating Capacity Desired of Types "S" and "T"

These standard types of arrangement are very elastic as to the size and capacity required to suit any desired combination, and to designate the various sizes so they may be referred to intelligently, we have adopted an index system as follows:

First giving the letter indicating which standard type is referred to, as arrangement "S" for stock facing out, or arrangement "T" for stock facing in; the type index letter is followed by the number

of cow stalls desired and this is followed by the number of horse stalls desired; placing a dash between the numbers to prevent confusion.

For example: A combination horse and dairy barn, with stock facing out, having 8 horse stalls and 20 cow stalls, would be indexed as, "Arrangement Type S-20-8."

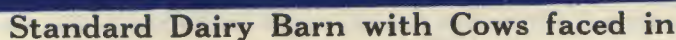
Table number 13 has been worked out to give the length of barn required for various capacities of arrangement for type "S" and type "T." All of these include a pen division which may be deducted from the total length in case the pens are not wanted.

TABLE No. 13

NUMBER OF HORSE STALLS REQUIRED	NUMBER OF COW STALLS REQUIRED		50	48	46	44	42	40	38	36	34	32	30
	12	Index Number.....	S-50-12	S-48-12	S-46-12	S-44-12	S-42-12	S-40-12	S-38-12	S-36-12	S-34-12	S-32-12	S-30-12
		Length of Horse Division.....	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"
		Length of Feed Division.....	16' 0"	16' 0"	16' 0"	16' 0"	16' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"
		Length of Cow Stall Division.....	92' 0"	89' 0"	85' 0"	82' 0"	78' 0"	75' 0"	71' 0"	68' 0"	64' 0"	61' 0"	57' 0"
		Length of Pen Division.....	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	30' 0"	30' 0"	30' 0"	30' 0"
	Total length of Barn.....		186' 0"	183' 0"	179' 0"	176' 0"	172' 0"	167' 0"	163' 0"	152' 0"	148' 0"	145' 0"	141' 0"
	10	Index Number.....	S-50-10	S-48-10	S-46-10	S-44-10	S-42-10	S-40-10	S-38-10	S-36-10	S-34-10	S-32-10	S-30-10
		Length of Horse Division.....	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"
		Length of Feed Division.....	16' 0"	16' 0"	16' 0"	16' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"
		Length of Cow Stall Division.....	92' 0"	89' 0"	85' 0"	82' 0"	78' 0"	75' 0"	71' 0"	68' 0"	64' 0"	61' 0"	57' 0"
		Length of Pen Division.....	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	30' 0"	30' 0"	30' 0"	30' 0"
	Total length of Barn.....		181' 0"	178' 0"	174' 0"	171' 0"	165' 0"	162' 0"	158' 0"	147' 0"	143' 0"	140' 0"	136' 0"
	8	Index Number.....	S-50-8	S-48-8	S-46-8	S-44-8	S-42-8	S-40-8	S-38-8	S-36-8	S-34-8	S-32-8	S-30-8
		Length of Horse Division.....	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"
		Length of Feed Division.....	16' 0"	16' 0"	16' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"
		Length of Cow Stall Division.....	92' 0"	89' 0"	85' 0"	82' 0"	78' 0"	75' 0"	71' 0"	68' 0"	64' 0"	61' 0"	57' 0"
		Length of Pen Division.....	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	30' 0"	30' 0"	30' 0"	30' 0"
	Total length of Barn.....		176' 0"	173' 0"	169' 0"	164' 0"	160' 0"	157' 0"	153' 0"	142' 0"	138' 0"	135' 0"	131' 0"
6	Index Number.....	S-50-6	S-48-6	S-46-6	S-44-6	S-42-6	S-40-6	S-38-6	S-36-6	S-34-6	S-32-6	S-30-6	
	Length of Horse Division.....	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	
	Length of Feed Division.....	16' 0"	16' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	
	Length of Cow Stall Division.....	92' 0"	89' 0"	85' 0"	82' 0"	78' 0"	75' 0"	71' 0"	68' 0"	64' 0"	61' 0"	57' 0"	
	Length of Pen Division.....	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	30' 0"	30' 0"	30' 0"	30' 0"	
Total length of Barn.....		171' 0"	168' 0"	162' 0"	159' 0"	155' 0"	152' 0"	148' 0"	137' 0"	133' 0"	130' 0"	126' 0"	
4	Index Number.....	S-50-4	S-48-4	S-46-4	S-44-4	S-42-4	S-40-4	S-38-4	S-36-4	S-34-4	S-32-4	S-30-4	
	Length of Horse Division.....	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	
	Length of Feed Division.....	16' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	
	Length of Cow Stall Division.....	92' 0"	89' 0"	85' 0"	82' 0"	78' 0"	75' 0"	71' 0"	68' 0"	64' 0"	61' 0"	57' 0"	
	Length of Pen Division.....	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	38' 0"	30' 0"	30' 0"	30' 0"	30' 0"	
Total length of Barn.....		166' 0"	161' 0"	157' 0"	154' 0"	150' 0"	147' 0"	143' 0"	132' 0"	128' 0"	125' 0"	121' 0"	
NUMBER OF COW STALLS REQUIRED		28	26	24	22	20	18	16	14	12	10		
12	Index Number.....	S-28-12	S-26-12	S-24-12	S-22-12	S-20-12	S-18-12	S-16-12	S-14-12	S-12-12	S-10-12		
	Length of Horse Division.....	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"	40' 0"		
	Length of Feed Division.....	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	12' 0"	12' 0"	12' 0"		
	Length of Cow Stall Division.....	54' 0"	50' 0"	47' 0"	43' 0"	40' 0"	36' 0"	33' 0"	29' 0"	26' 0"	22' 0"		
	Length of Pen Division.....	30' 0"	30' 0"	30' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"		
Total length of Barn.....		138' 0"	134' 0"	131' 0"	117' 0"	114' 0"	110' 0"	105' 0"	101' 0"	98' 0"	94' 0"		
10	Index Number.....	S-28-10	S-26-10	S-24-10	S-22-10	S-20-10	S-18-10	S-16-10	S-14-10	S-12-10	S-10-10		
	Length of Horse Division.....	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"	35' 0"		
	Length of Feed Division.....	14' 0"	14' 0"	14' 0"	14' 0"	14' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"		
	Length of Cow Stall Division.....	54' 0"	50' 0"	47' 0"	43' 0"	40' 0"	36' 0"	33' 0"	29' 0"	26' 0"	22' 0"		
	Length of Pen Division.....	30' 0"	30' 0"	30' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"		
Total length of Barn.....		133' 0"	129' 0"	126' 0"	112' 0"	109' 0"	103' 0"	100' 0"	96' 0"	93' 0"	89' 0"		
8	Index Number.....	S-28-8	S-26-8	S-24-8	S-22-8	S-20-8	S-18-8	S-16-8	S-14-8	S-12-8	S-10-8		
	Length of Horse Division.....	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"	30' 0"		
	Length of Feed Division.....	14' 0"	14' 0"	14' 0"	14' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"		
	Length of Cow Stall Division.....	54' 0"	50' 0"	47' 0"	43' 0"	40' 0"	36' 0"	33' 0"	29' 0"	26' 0"	22' 0"		
	Length of Pen Division.....	30' 0"	30' 0"	30' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"		
Total length of Barn.....		128' 0"	124' 0"	121' 0"	107' 0"	102' 0"	98' 0"	95' 0"	91' 0"	88' 0"	84' 0"		
6	Index Number.....	S-28-6	S-26-6	S-24-6	S-22-6	S-20-6	S-18-6	S-16-6	S-14-6	S-12-6	S-10-6		
	Length of Horse Division.....	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"	25' 0"		
	Length of Feed Division.....	14' 0"	14' 0"	14' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"		
	Length of Cow Stall Division.....	54' 0"	50' 0"	47' 0"	43' 0"	40' 0"	36' 0"	33' 0"	29' 0"	26' 0"	22' 0"		
	Length of Pen Division.....	30' 0"	30' 0"	30' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"		
Total length of Barn.....		123' 0"	119' 0"	116' 0"	100' 0"	97' 0"	93' 0"	90' 0"	86' 0"	83' 0"	79' 0"		
4	Index Number.....	S-28-4	S-26-4	S-24-4	S-22-4	S-20-4	S-18-4	S-16-4	S-14-4	S-12-4	S-10-4		
	Length of Horse Division.....	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"		
	Length of Feed Division.....	14' 0"	14' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"		
	Length of Cow Stall Division.....	54' 0"	50' 0"	47' 0"	43' 0"	40' 0"	36' 0"	33' 0"	29' 0"	26' 0"	22' 0"		
	Length of Pen Division.....	30' 0"	30' 0"	30' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"	20' 0"		
Total length of Barn.....		118' 0"	114' 0"	109' 0"	95' 0"	92' 0"	88' 0"	85' 0"	81' 0"	78' 0"	74' 0"		

The feed room has been placed in one corner of the barn so it can be entered from the center feed alley. The hay chute comes down in the corner of the feed room nearest the mangers, extending down to the floor with a dust tight door. The silo is placed at the side of the barn so as to keep the end of barn clear for future extensions.

For example: A dairy barn for stock facing in, having 20 stalls and 4 pens would be designated as "Type U-20-4."



F. J. BANNISTER.

The Standard Dairy Barn Arrangement Type "V"

Type V is our standard arrangement of dairy barns for cows facing out. This type, like type U, may be used for a barn of any capacity desired, either with or without pens, and may be enlarged at a future date by building on to one end of the barn for increasing the stall capacity or building on to the other end for increasing the pen capacity where pens are used.

The feed is placed at one side at the end of a cross alley and where pens are used this separates the pen division from the milking division. In case no pens are to be included in the barn, such as is shown below, this cross alley forms one end of the barn; preferably the north end.

A table giving the size required for various capacities will be found on page 43. This arrangement may be used for either a one-story barn or a barn with a hay mow above.

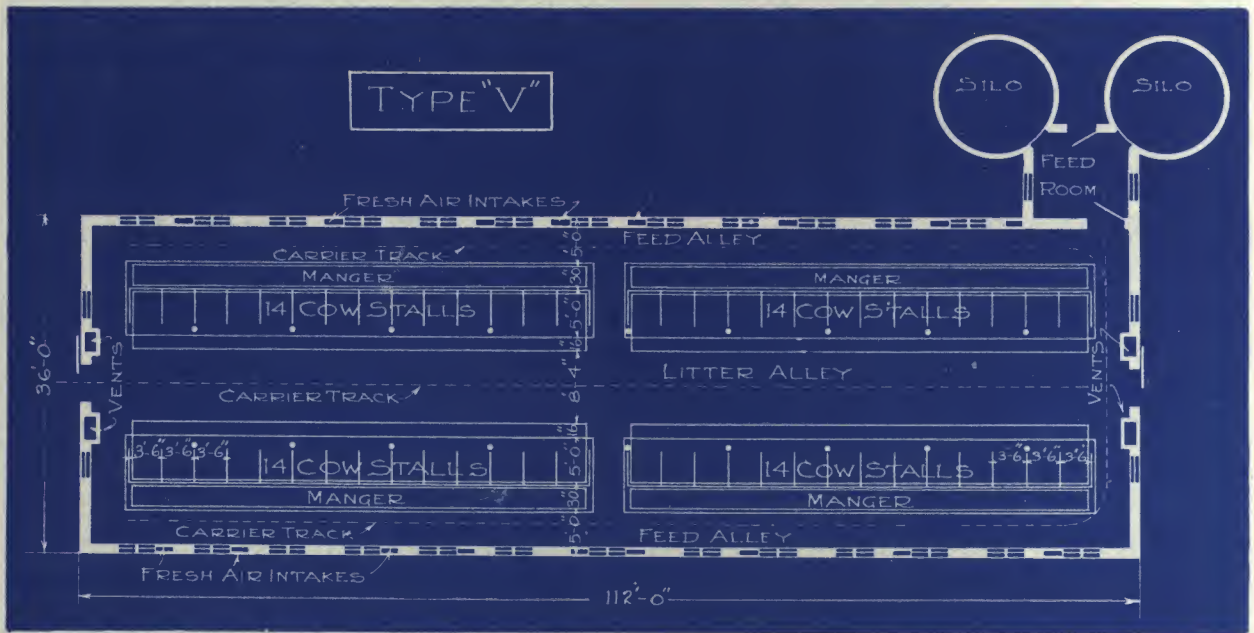
WHY BUILD FROM PLANS?

Complete plans will protect you against waste of material due to guessing, and working in the dark as to measurements.

They will protect you against waste of time, due to delay necessary in figuring out details of construction while the work is in progress.

They will protect you against the misunderstandings which so often arise between owner and builder.

Every plan we execute is of the highest order. Our great organization enables us to give you the very best service at a very moderate price.



Standard Dairy Barn with Cows faced out

Type "V" allows the use of any number of pens desired although no pens are shown in the above cut, which you will see by referring to table 14 on the opposite page is V-56-0. This means it will contain 56 cow stalls and stanchions and has no pens.

Pick out the size barn you desire from tables 14 or 15 and give us the key number. Tell us how many tons hay storage you desire and ask us to recommend the type cross section to use, and to quote you on complete working plans and specifications.

Tables Showing Lengths of Dairy Barns Required for Various Capacities

TABLE No. 14

TABLE OF LENGTHS FOR TYPE U						
PLAN INDEX	Number of Stalls	Number of Pens	Length of Barn With Cross Alley at Each End	PLAN INDEX	Number of Stalls	Number of Pens
U-10-0	10	...	33	U-56-0	56	...
U-12-0	12	...	37	U-58-0	58	...
U-14-0	14	...	40	U-60-0	60	...
U-16-0	16	...	44	U-60-8	60	8
U-16-2	16	2	54	U-60-10	60	10
U-18-0	18	...	48	U-62-0	62	...
U-20-0	20	...	51	U-64-0	64	...
U-20-2	20	2	61	U-66-0	66	...
U-20-4	20	4	70	U-66-8	66	8
U-22-0	22	...	55	U-68-0	68	...
U-24-0	24	...	58	U-70-0	70	...
U-24-2	24	2	68	U-70-10	70	10
U-26-0	26	...	62	U-72-0	72	...
U-28-0	28	...	65	U-72-10	72	10
U-30-0	30	...	69	U-74-0	74	...
U-30-4	30	4	88	U-76-0	76	...
U-32-0	32	...	72	U-78-0	78	...
U-32-4	32	4	91	U-80-0	80	...
U-34-0	34	...	76	U-80-10	80	10
U-36-0	36	...	80	U-80-12	80	12
U-36-4	36	4	99	U-82-0	82	...
U-38-0	38	...	83	U-84-0	84	...
U-40-0	40	...	87	U-86-0	86	...
U-40-6	40	6	115	U-88-0	88	...
U-42-0	42	...	90	U-90-0	90	...
U-44-0	44	...	94	U-90-10	90	10
U-46-0	46	...	98	U-90-12	90	12
U-46-6	46	6	126	U-92-0	92	...
U-48-0	48	...	101	U-94-0	94	...
U-48-6	48	6	129	U-96-0	96	...
U-48-8	48	8	137	U-98-0	98	...
U-50-0	50	...	105	U-100-0	100	...
U-50-6	50	6	133	U-100-10	100	10
U-50-8	50	8	141	U-100-12	100	12
U-52-0	52	...	108	U-100-14	100	14
U-54-0	54	...	102	U-100-16	100	16

TABLE No. 15

TABLE OF LENGTHS FOR TYPE V						
PLAN INDEX	Number of Stalls	Number of Pens	Length of Barn With Cross Alley at Each End	PLAN INDEX	Number of Stalls	Number of Pens
V-10-0	10	...	26	V-56-0	56	...
V-12-0	12	...	30	V-58-0	58	...
V-14-0	14	...	32	V-60-0	60	...
V-16-0	16	...	37	V-60-8	60	8
V-16-2	16	2	47	V-60-10	60	10
V-18-0	18	...	40	V-62-0	62	...
V-20-0	20	...	44	V-64-0	64	...
V-20-2	22	2	54	V-66-0	66	...
V-20-4	24	4	63	V-66-8	66	8
V-22-0	22	...	48	V-68-0	68	...
V-24-0	24	...	51	V-70-0	70	...
V-24-2	24	2	61	V-70-10	70	10
V-26-0	26	...	55	V-72-0	72	...
V-28-0	28	...	58	V-72-10	72	10
V-30-0	30	...	62	V-74-0	74	...
V-30-4	30	4	81	V-76-0	76	...
V-32-0	32	...	65	V-78-0	78	...
V-32-4	32	4	84	V-80-0	80	...
V-34-0	34	...	69	V-80-10	80	10
V-36-0	36	...	72	V-80-12	80	12
V-36-4	36	4	91	V-82-0	82	...
V-38-0	38	...	76	V-84-0	84	...
V-40-0	40	...	80	V-86-0	86	...
V-40-6	40	6	108	V-88-0	88	...
V-42-0	42	...	83	V-90-0	90	...
V-44-0	44	...	87	V-90-10	90	10
V-46-0	46	...	90	V-90-12	90	12
V-46-6	46	6	118	V-92-0	92	...
V-48-0	48	...	94	V-94-0	94	...
V-48-6	48	6	122	V-96-0	96	...
V-48-8	48	8	130	V-98-0	98	...
V-50-0	50	...	98	V-100-0	100	...
V-50-6	50	6	126	V-100-10	100	10
V-50-8	50	8	134	V-100-12	100	12
V-52-0	52	...	101	V-100-14	100	14
V-54-0	54	...	105	V-100-16	100	16

The length of barns required for various capacities, as given in the tables Nos. 13, 14 and 15, are figured on the basis of 3 feet 6 inches for the width of the cow stalls.

This width of cow stall has been used because it is the most popular and it is the best size to use for housing Jersey or Guernsey cattle, but where large stock like the Ayrshire and Holstein are to be housed it is advisable to make the stalls 3 feet 10 inches to 4 feet 6 inches in width.

The length of the stall floor should also be built to suit the size of the animals to be housed. In all our plans the length of the stall floor is taken from the center line of the stanchion to the edge of the gutter.

This distance should never be less than 4 feet 6 inches for the smallest stock nor over 5 feet

6 inches for the largest. By many it is considered good practice to make the stalls at one end of the row longer than at the other end, by constructing the gutter at a slight angle to the manger, in place of running it parallel with the manger; thereby graduating the length of the stalls from the shortest at one end to the longest at the other end of the row. With this arrangement the various sized animals may be placed in the stalls most suitable for their length.

We would recommend graduating the stalls:

From 4 feet 6 inches to 5 feet for Jersey cows,

From 4 feet 8 inches to 5 feet 2 inches for Guernsey cows,

From 4 feet 10 inches to 5 feet 4 inches for Ayrshire cows and

From 5 feet to 5 feet 6 inches for Holstein cows.

OUR COMPLETE ARCHITECTURAL SERVICE

This book shows representative designs for various types of barns. In the preparation of this work great care has been exercised in the selection of original, practical and attractive barns, such as seventy-five to ninety per cent of the farmers wish to build. In drawing these plans special effort has been made to provide for **economical construction**, giving the farmer or dairyman the benefit of the saving of many dollars. In no case have we put any useless expense upon the barn simply to carry out a favorite idea. In these plans every bit of space has been utilized to best advantage.

HIGH CLASS PLANS:

This department has an equipment for producing plans for modern farm structures of every kind that is superior to any in this country. Every plan is designed by men that stand at the head of their profession as farm structure architects and engineers.

Any of the plans we furnish are equal to those made by regular practicing city architects at a fee of 5% of the cost of the building and are in most cases superior because **we specialize** in farm buildings while the general architect only designs a few barns each year.

OUR STOCK DESIGNS:

We have in stock complete, blue printed, plans and specifications, which we can send you at once, of each of the designs upon which prices are quoted in this book. The prices as quoted are for stock plans only and do not include the cost of making alterations or changes in the plans.

ALTERING STOCK PLANS:

If you like one of the designs in this book, with a few little changes, write to us about the changes you want, before ordering the plan, and we will advise you about the cost of making the alterations in the plan, in case the change would involve any expense.

FREE SUGGESTIVE SERVICE:

A large part of our architectural service is rendered free. We make no charge for preliminary sketches and suggestions as to any kind of building improvement about the farm. No charge is made for the opinion of our experts on any questions regarding any questions about farm improvement arrangement, design, construction or cost.

SPECIAL WORKING PLANS AND SERVICE:

We are in a position to render expert service on any question concerning permanent improvements on your farm, from the locating and grouping of the buildings, to the furnishing of complete working plans of special designs worked out after your particular requirements. This service would be the most profitable investment about your farm regardless of how large or small it may be. Our architect can visit your farm and consult with you personally regarding improvements, at a nominal cost for his time and expenses. Price on special working plans will be quoted upon receipt of full information.

BLUE PRINTED WORKING PLANS:

The plans we send out are the regular blue printed plans, details and specifications, carefully reproduced by the electric blue print process from the architect's drawings and typewritten specifications. All accurately drawn to a convenient scale, showing the arrangement of all stalls, pens, bins, rooms, etc. Elevation drawings of the four exterior sides, cross sections showing the construction and framing, larger scale details giving full information and figures for all parts of the construction.

DETAILS:

All necessary details of the interior work, construction of windows, doors, cornices, vent flues, hay chutes, cement floors, cement gutters and mangers, framing of structural members, trusses and all other parts that require detail drawings are clearly drawn to a larger scale, giving dimensions and kinds of material used. We guarantee to furnish details for everything that is necessary to clearly illustrate the meaning of the plans to the builder. Should there be any doubt in your mind about any part of the construction that is not made clear by the drawings you receive, write us fully and we will furnish details of the parts in question without any charge.

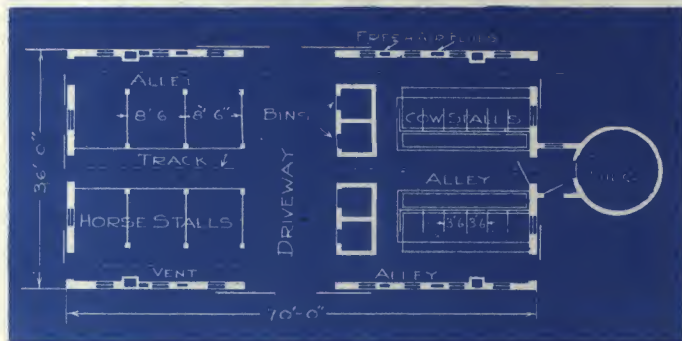
SPECIFICATIONS:

Complete specifications are furnished with each set of plans, blue printed from the architect's original typewritten copy so no clerical errors can be made in reproducing them and so they can not be changed by a dishonest workman on the job, without discovery. They consist of 18 to 25 pages of closely typewritten matter, letter size, giving full instructions for carrying out the work.

All necessary instructions are given in simple and most explicit manner so there can be no misunderstanding.

A Few of Our Most Popular Combination Barns

Design 1842 is for 12 Cows and 12 Horses

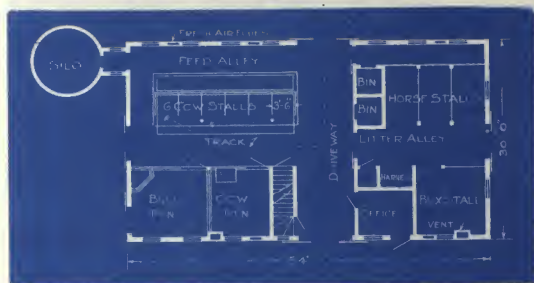


Design 1842

Design 2420 for 4 cows and 4 horses and with a wagon shed on one side is 32 by 38 feet. It has two small calf pens and harness room. The mow has space for two grain bins, store room, and ten tons of loose hay.

Design 8551 is a very complete combination barn having a driveway through the center between the cow and horse sections. Cows and horses are faced out.

There are stalls for six cows, one cow and one bull pen. There are three single and one box stalls for horses, a small office which can be used for grain; bins, tool and harness closets.



Design 8551

Design 8596 is a gothic type barn 36 feet wide by 70 feet long with stalls for 19 cows and 6 horses. Two horse stalls are single and two are double. It also has one pen for calves and one bull pen. Cows face in.

The plans include a milk room with a covered passage connected with the barn. It has a mow capacity of 65 tons loose hay. In the mow are grain bins with spouts leading to the feed alley below.

Price of Complete working plans and specifications for any of the \$5.00 above Designs...

This barn is 36 ft. wide by 70 ft. long.

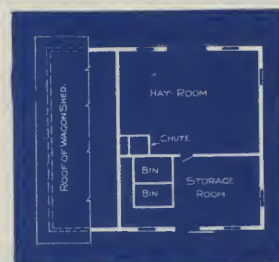
The foundation wall extends 12 in. above the ground and the frame sidewalls are 16 ft. high.

The lower story is 10 ft. high, the hay mow is 22 ft. high from the floor to hay carrier-track, the vertical sidewalls in the hay mow are 5 ft. high, and the ridge of roof is 35 ft. above the ground.

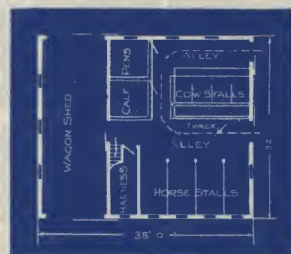
The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 80 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.



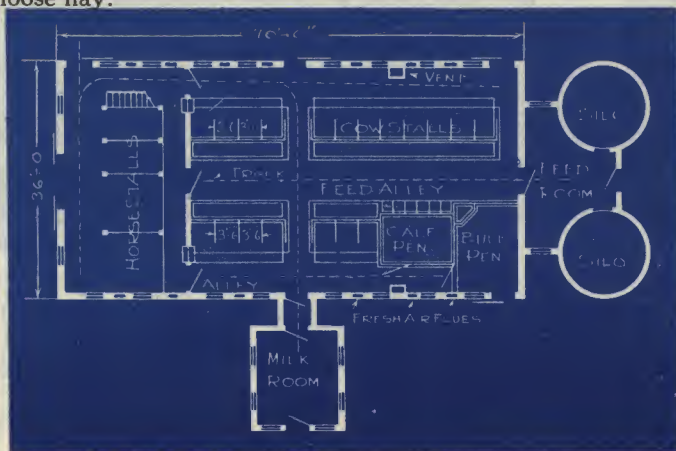
Plan of Hay Mow



Design 2420

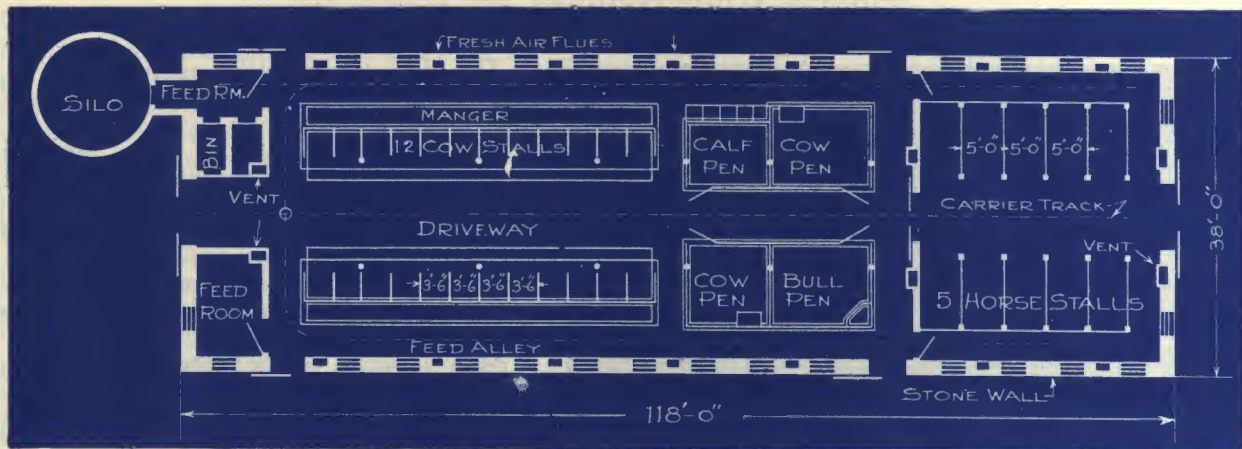
The silo, which is of reinforced concrete, has a water tank at the top. Beneath the driveway is a root cellar which is filled through a trap door in the driveway.

This barn is of frame, type "K" construction—30x54 and appears much like Design 1757, page 91, but is smaller, having a mow capacity of 20 tons loose hay.



Design 8596

Two Good Combination Barns

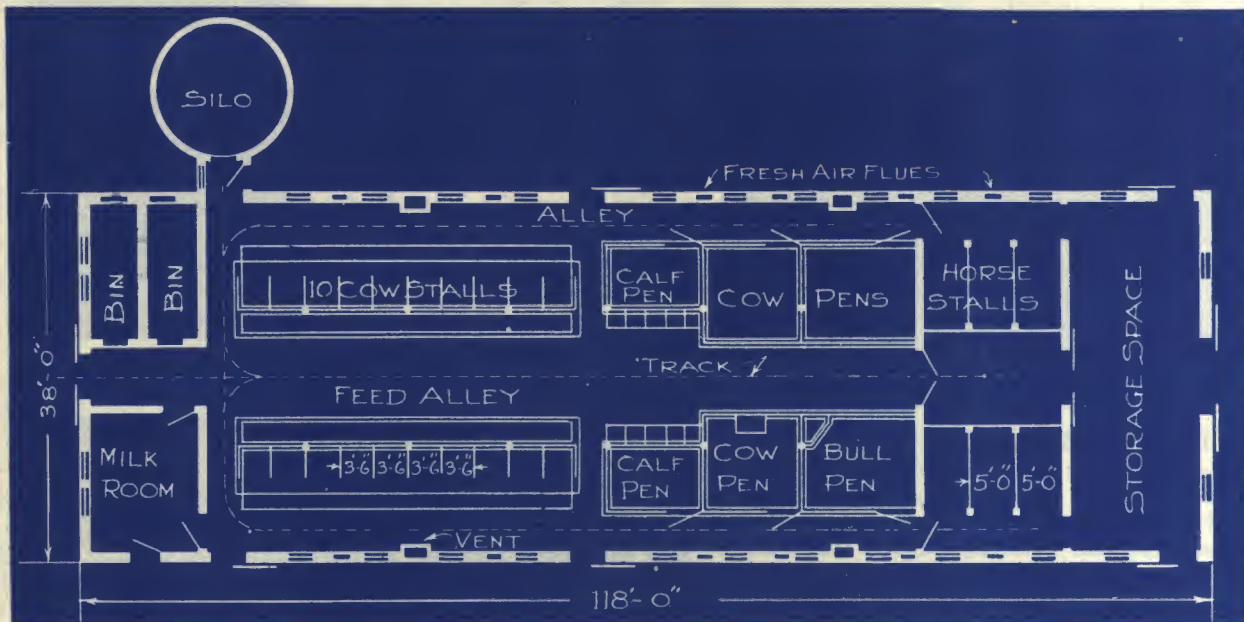


Design 8525-A—For 24 Cows and 10 Horses

Design 8525-A is a combination barn having a stone first story. The upper part is of frame type "L" construction—having a hay capacity of 100 tons of loose hay.

It is 38 feet wide by 118 feet long and has feed room, bins, and one silo.

There are stalls for 24 cows, 2 cow pens, one calf and one bull pen. The horse section which is divided from the dairy section by a partition has 10 single stalls. Both horses and cows are faced out.



Design 2569—For 20 Cows and 6 Horses

This barn is 38 feet wide by 118 feet long.

The foundation wall extends 4 feet above the ground and the frame sidewalls are 12 feet high.

The lower story is 9 feet high, the hay mow is 24 feet high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 5 feet high, and the ridge of roof is 36 feet above the ground.

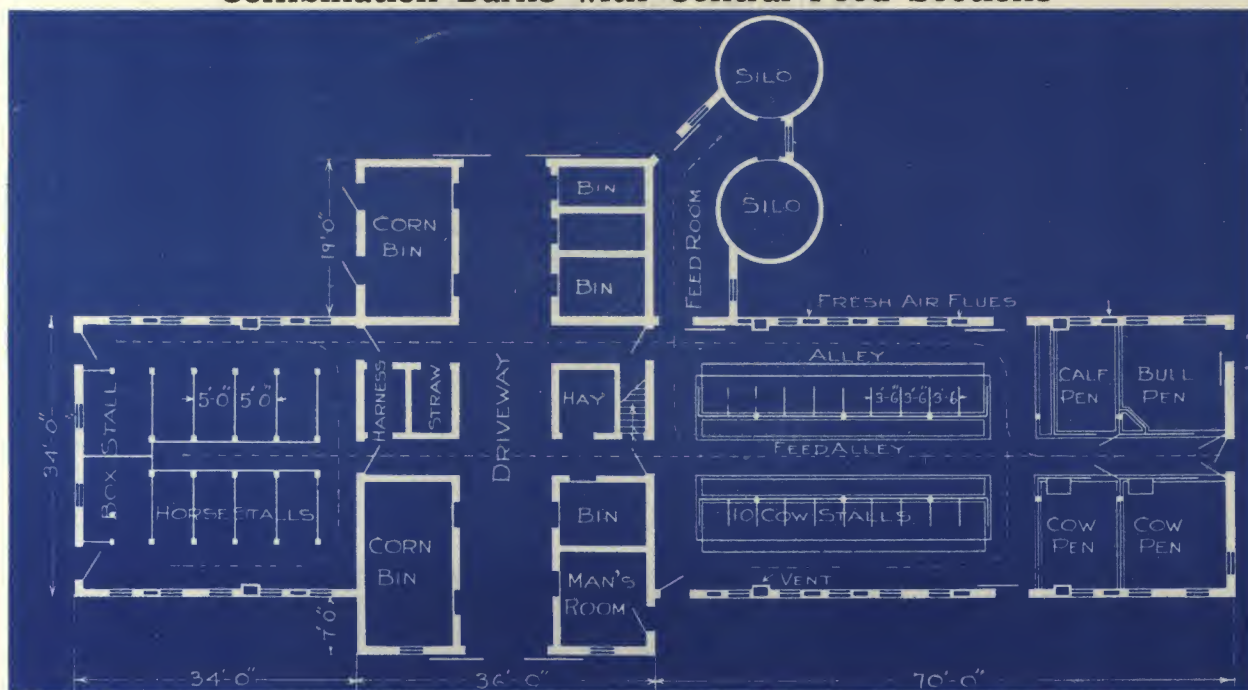
The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 150 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Price of Complete working plans and specifications for either Design \$5.00 2569 or 8525-A....

Combination Barns with Central Feed Sections



Design 8697-A

This combination barn has a one-story section for horses, a two-story feed section with a driveway through the center, and a one-story section for dairy cows.

The feed section has harness room, straw chute, hay chute, corn cribs, grain bins and attendant's room. A raised ceiling over part of the drive permits the use of a corn sheller between the crib and bins. The mow has a capacity of 60 tons of loose hay.

The dairy section has stalls for 20 cows, two cow pens, one calf pen and one bull pen.

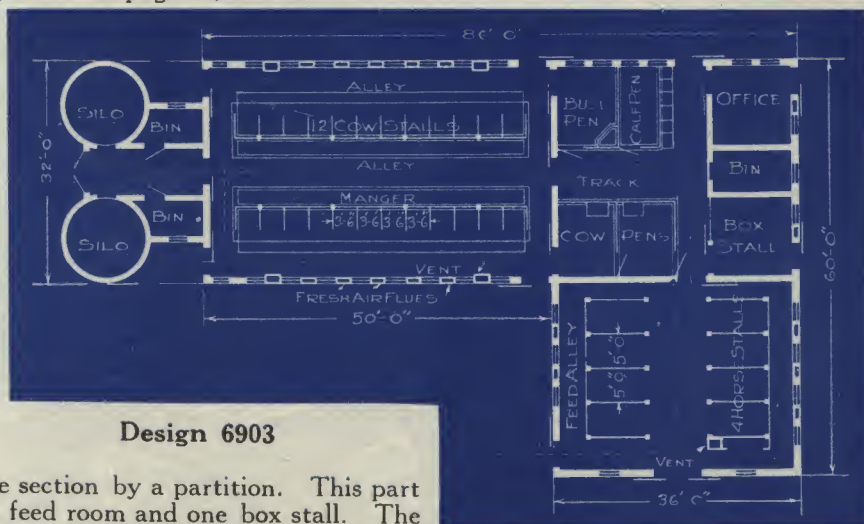
This barn is similar to design 3335 on page 49, but smaller.

Design 6902

This is a model combination "L" type frame barn.

The dairy wing is one story, 32 by 50. There are stalls for 24 cows faced in. On the south are two 12-foot silos and convenient grain bins for feed for the cows in this section. There are two cow pens, one calf pen and one bull pen in the main section of the barn which is separated from the dairy section and also the horse section by a partition. This part of the main barn also contains a feed room and one box stall. The east end of the main barn contains 8 single stalls for horses which are faced out. There is a convenient harness closet and water trough.

The main barn is 36 by 60 feet. The mow has a capacity of 80 tons and is filled from the east e.d. Plans for a manure pit 14 by 22 feet are included with this set.



Design 6903

Price of Complete working plans and specifications, for either Design **\$10.00** 6902 or 8697-A ...

Designing the Farmstead

Every farm owner should have definite plans developed in advance for all future improvements and should have some idea of the cost of each improvement long before he is ready to make it so that he will be fully prepared to make improvements intelligently as the profits of the farm will permit.

The increased value of the property by having the buildings well planned and their surroundings beautified with material which can in most cases be had for the gathering, is at once apparent.

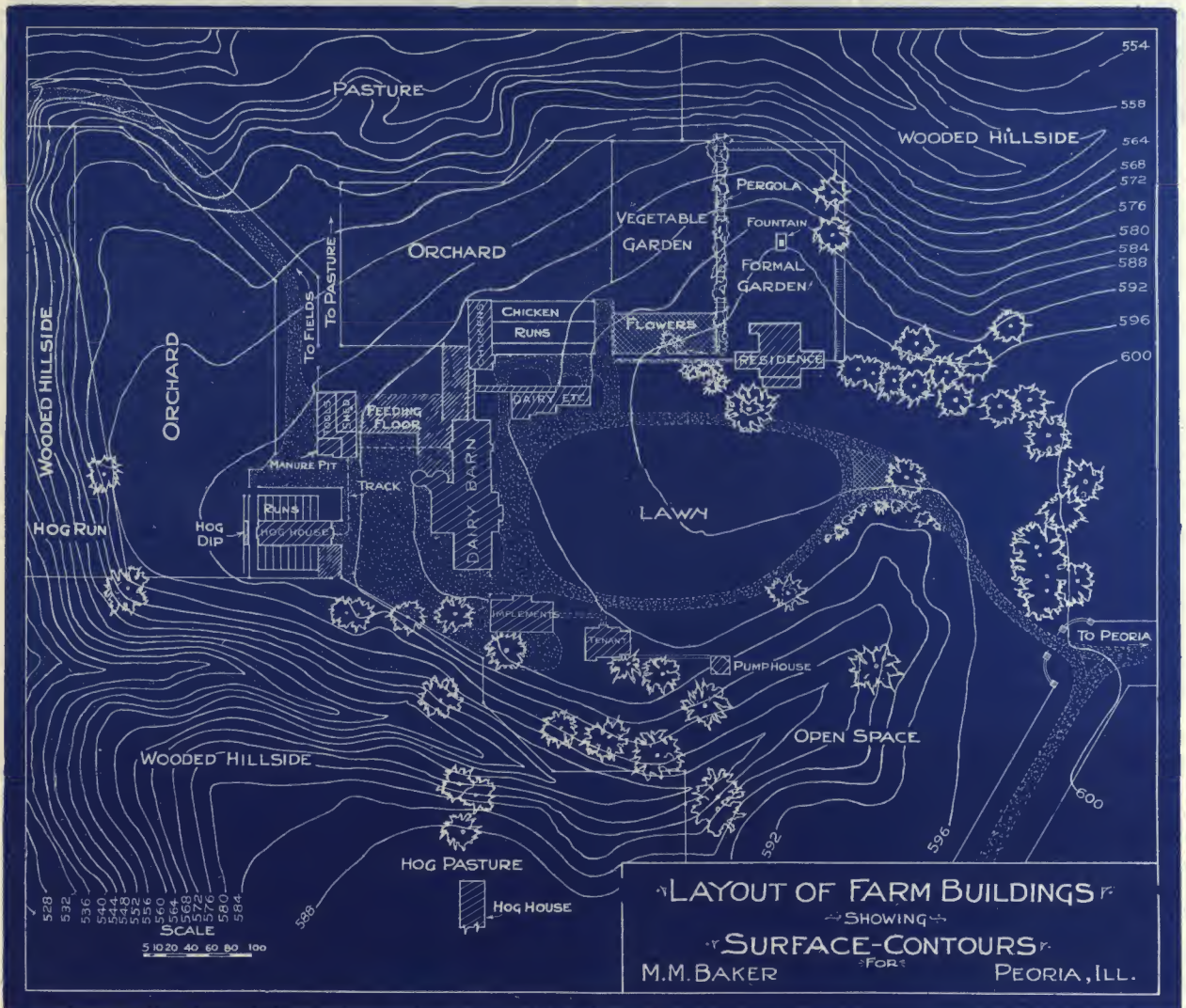
The buildings should be placed in their relation to each other and also with regards to a fine outlook and of a pleasing effect in outline. The location of trees and plants should be studied in connection with the buildings so the appearance will be that of a place where it would be a pleasure to live and encouraging for the young folks to stay on the farm to later complete the execution of the plans previously made by their parents.

Good air, good water, good drainage, sunshine, shelter from cold winter winds, away from the dust of the highway and the odors of the stock are some of the important requirements of the farm house.

There are so many points that must be taken into careful consideration in the proper location and grouping of permanent improvements on the farm that the cost of the service of our specialists will be money well spent on the average farm and for a small farm an opinion as to the location of your buildings may be of great help to you. Where no special trip to your farm or other expense is involved we make no charge for assistance along this line.

Some of the points that should be considered are climatic conditions, existing improvements, convenience to fields and highway, direction of prevailing winds and sunshine, kind of farming to be practiced and a general pleasing effect.

The farmstead specialists in our department of Agricultural-Architecture are perfectly equipped and capable of furnishing you expert advisory service and practical plans for the general arrangement of your farmstead. Having made this work a life study and having traveled in all parts of the United States makes them conversant with climatic and soil conditions.





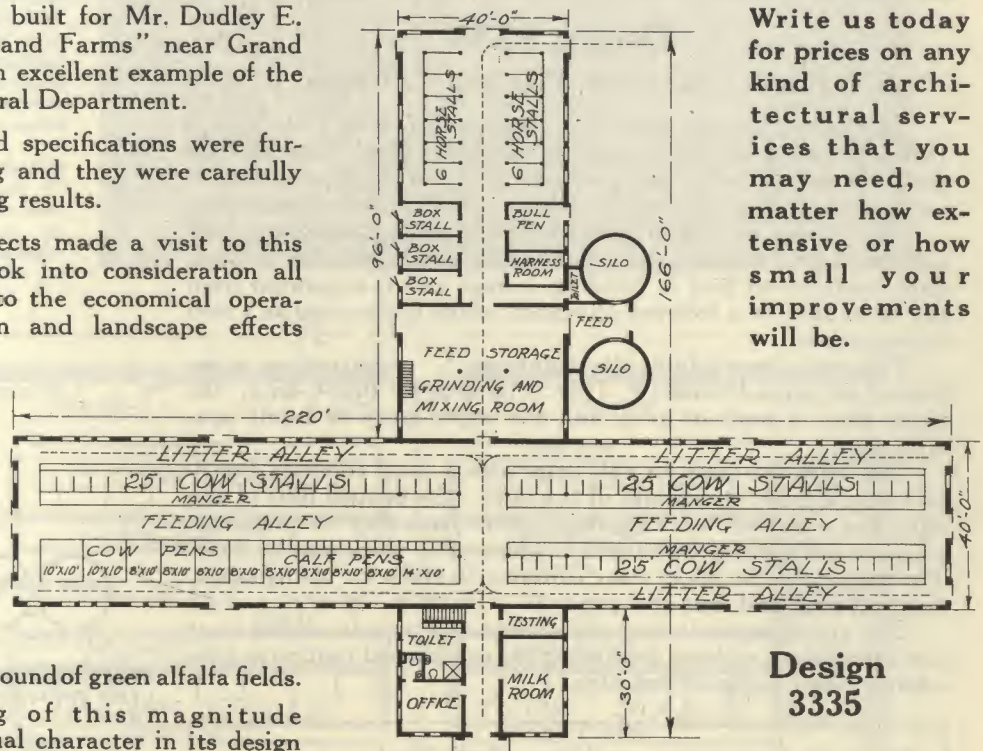
Design 3335

This beautiful barn built for Mr. Dudley E. Waters on his "Maryland Farms" near Grand Rapids, Michigan, is an excellent example of the work of our Architectural Department.

Complete plans and specifications were furnished for the building and they were carefully followed with gratifying results.

One of our Architects made a visit to this farm and carefully took into consideration all conditions pertaining to the economical operation, future expansion and landscape effects before the plans were drawn and the results are that the building is not only practical but its restful outlines of the sea green roof against the blue sky makes a beautiful effect in combination with the soft shade of stucco walls against the background of green alfalfa fields.

Each farm building of this magnitude should display individual character in its design and the nominal cost of good architectural service will not only supply this demand but will prevent all possibilities of making serious mistakes in its construction and efficient arrangement.



Write us today for prices on any kind of architectural services that you may need, no matter how extensive or how small your improvements will be.

**Design
3335**



Design 5333

For 74 Cows—Bull, Cow and Calf Pens

This dairy barn was erected at the famous French Lick Springs Hotel, French Lick, Ind., which is owned by Hon. Thomas Taggart. It is built after plans prepared by our Architectural Department and represents an ideal dairy barn for a large institution.

The milking barn is 36 by 142 ft., built of brick, one story high and contains 74 cow stalls. For sanitary reasons, this milking barn contains no feed or bedding storage and is separated from the main barn by a covered driveway, which is also used as a feed mixing room.

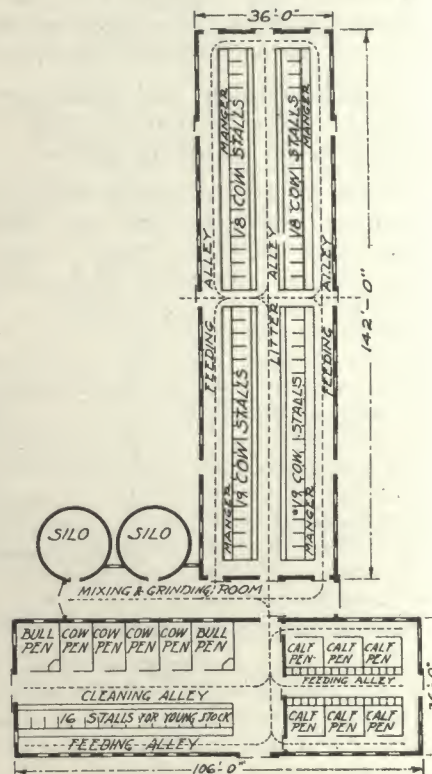
The main barn is built after our type "L" construction, as explained on pages 14 and 15. It is 36 ft. wide by 106 ft. long; the lower story is built of brick and the upper story of frame construction.

This barn contains six calf pens with a total capacity for 30 calves in a room at one end of the barn; the central part of the barn has a general working floor where feed may be prepared, where an animal may be bathed or where other work may be done. The balance of the lower story contains 16 stalls for young stock, two bull pens and four cow pens.

The arrangement is very convenient and may be added to at any future time without disturbing the established routine in case a larger plant becomes desirable.

Price of Complete working plans and specifications for Design No. 5333.....

\$10.00





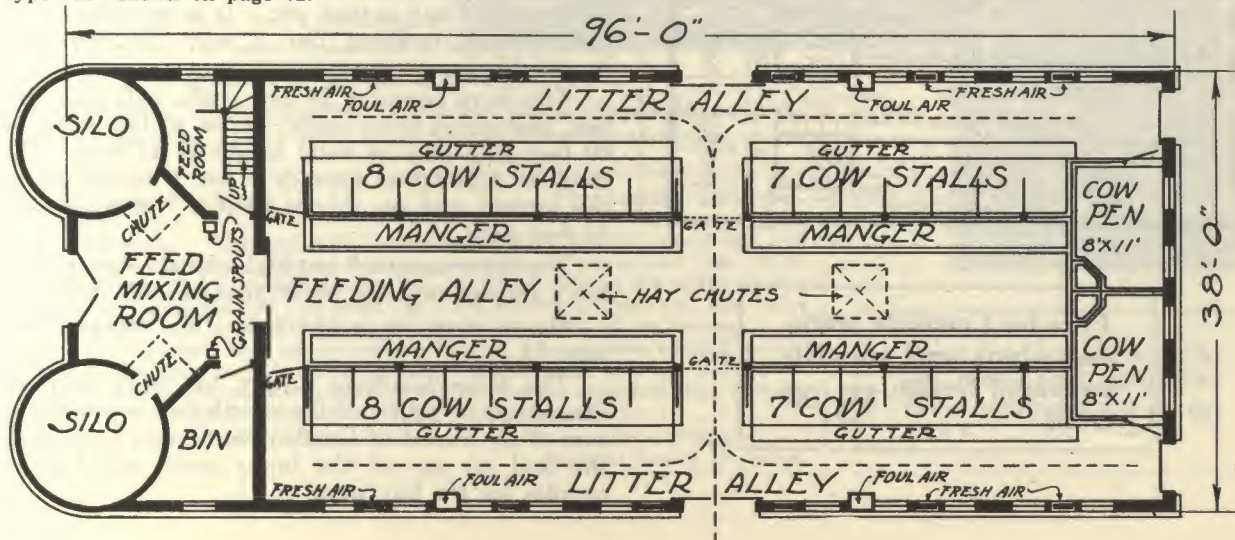
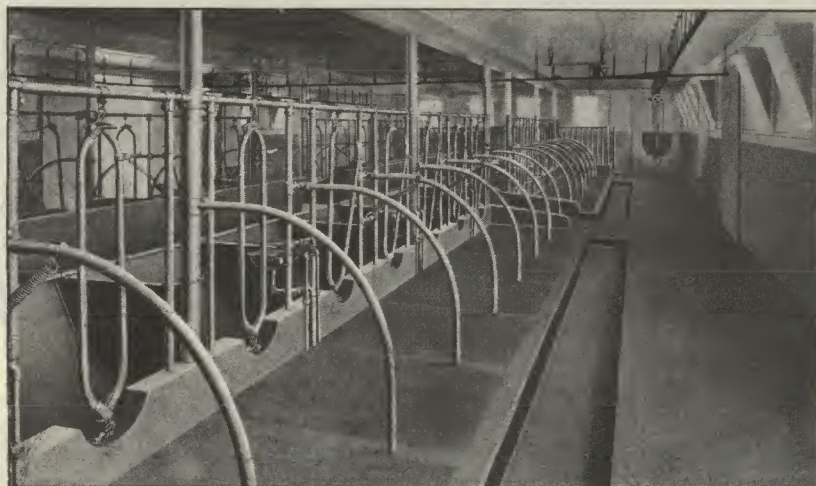
Design No. 7663

30 Cow Stalls—2 Pens

This dairy barn has been built on one of the prominent farms near Minneapolis and is an ideal design for a barn to house its herd for producing high class milk.

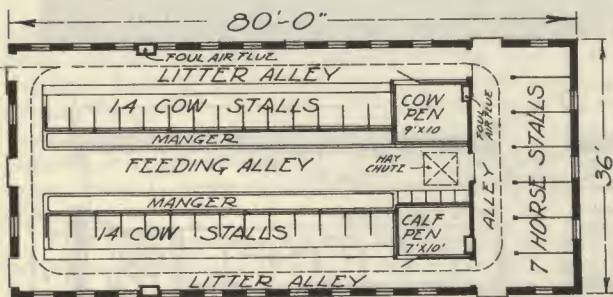
Each of the 30 cow stalls is provided with Automatic Water Bowls, Manger Divisions and Tubular Stanchions. One of the attractive features of this barn is the way the silos are built into the end of it. This not only gives them a substantial and pleasing appearance but protects the larger part of their contents from frost which, to say the least, is quite annoying.

The barn is built with a double brick wall, having a complete 4" air space, extending from the concrete foundation below grade, up to the window sills, and the balance is of frame construction similar to type "K" shown on page 12.





Design No. 6159
 28 Cows, 2 Pens, 7 Horses



Price for Complete working plans and specifications of Design 6159 **\$5.00**

This attractive barn has been built near Lincoln, Nebraska, for Mr. Franklin C. Hamer, after Loudon plans, and is equipped with Loudon stalls, pens, litter carrier, hay carrier, etc. It is not only a well proportioned building but a very practical and serviceable barn.

This barn contains 28 cow stalls, calf pen, cow pen, and seven horse stalls. It is 36 feet wide by 80 feet long and its total height is 37 feet. The concrete foundation extends 4 feet 6 inches above the ground and on this is built a frame sidewall 12 feet high.

The lower story is 9 feet high and the upper story has a storage capacity for 90 tons of loose hay.

Its construction is like type "K" explained on page 12.

The large windows supply the barn with an abundance of light and the ventilation is well taken care of by means of Loudon ventilators for pulling the foul air out of the lower story and Loudon cupolas for the hay mow.



Barn Built from Louden Plan for G. M. Titus, Muscatine, Iowa

Design 8197—For 30 Cows, 10 Horses

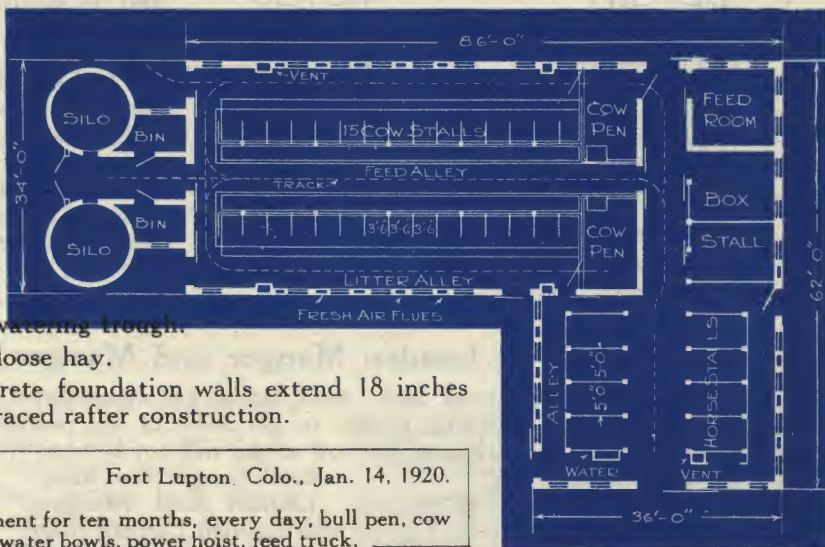
This combination barn is 62 feet by 86 feet and consists of a main barn which contains the hay storage and a one story "L" which is devoted to dairy cattle.

The barn has eight single stalls and two box stalls for horses in the two story section. The dairy section has thirty stalls and two cow pens.

The main barn has a feed room and there is a harness closet and a watering trough.

The mow capacity is 80 tons of loose hay.

The floor is of concrete. Concrete foundation walls extend 18 inches above the floor. The barn is of braced rafter construction.



The Louden Machinery Co.,
 Fairfield, Iowa.

Fort Lupton, Colo., Jan. 14, 1920.

Gentlemen: After using your equipment for ten months, every day, bull pen, cow pen, stalls, stanchions, manger divisions, water bowls, power hoist, feed truck, litter carrier, hay mow equipment, will say it has reduced the caring for the cows 50%, and will tell you what the cows are doing, then you can judge the results, and Louden Equipment is entitled to 70% of the increase.

At the present time we are milking 18 cows, part of them nearing the end of their lactation period and are getting 900 pounds of milk every 24 hours.

In closing will say that our farm will be Louden equipped from now on. Wishing you all the success possible, Yours very truly,

SUNNY SIDE DAIRY, W. C. Sauer & Son, Props.,
 (Signed) Ernest W. Sauer.

Price for Complete working plans and specifications of Design 8197 **\$10.00**



Design 1840—For Dairy Barn

Description

This barn is 126 ft. wide by 140 ft. long.

The foundation wall extends 18 inches above the ground and the frame sidewalls are 16 ft. high.

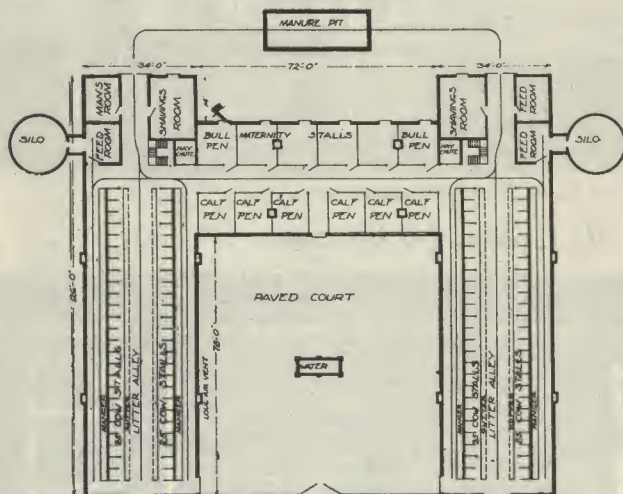
The lower story is 9½ ft. high, the hay mow is 22 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 6 ft. high, and the ridge of roof is 36 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Capacity of mow, 315 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.

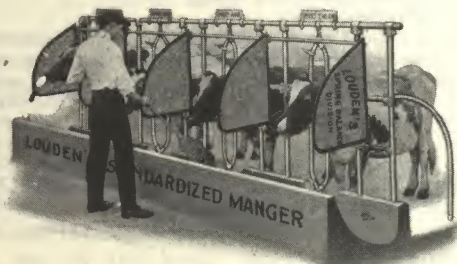
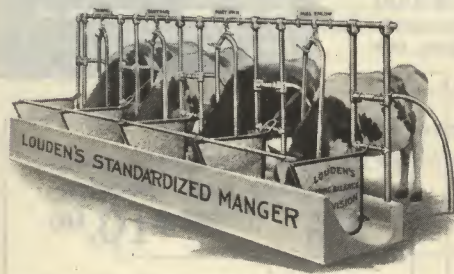


**Price of Complete working
 plans and specifications
 for Design 1840 \$25.00**

Louden Manger and Manger Divisions

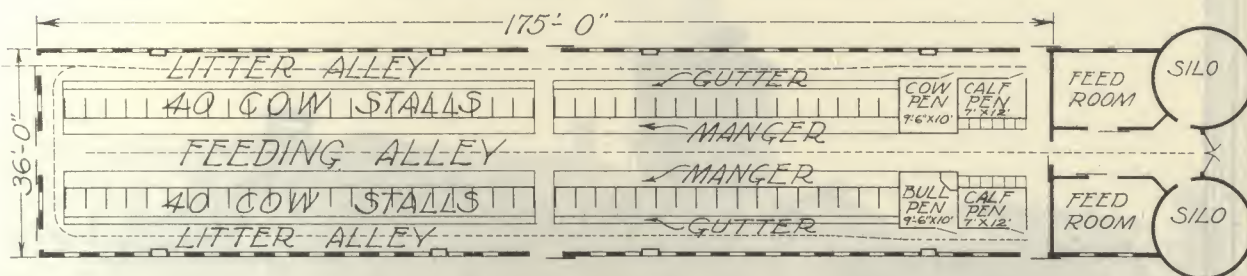
How comfortable the cows look, each eating her apportioned feed without interference from her neighbor, or without straining herself to get some of her neighbor's feed. The shape of the manger makes the feed roll down close to the cow so she will not have to strain to get it as she would if a flat-bottomed manger was used.

Louden Steel Mangers, also Louden Cement Mangers and Manger Divisions have been adopted by dairy authorities the world over as being the most lasting, convenient and sanitary, and the easiest constructed or installed. Send for special catalogs.





Design 2603 — For 80 Cows

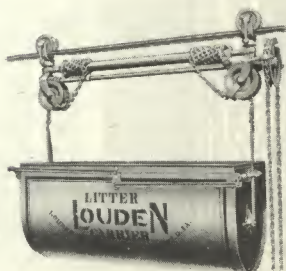


Description

This barn is 36 ft. wide by 175 ft. long.
 The foundation wall extends 4 ft. above the ground and the frame sidewalls are 10 ft. high.
 The lower story is 9½ ft. high, the hay mow is 19 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 3 ft. high, and the ridge of roof is 32 ft. above the ground.
 The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 145 tons loose hay.
 The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.
 Estimated cost furnished upon application.

Price of Complete working plans and specifications for Design 2603 \$15.00



Louden Litter Carriers

The Loudon Litter Carrier is a great time and labor saver. With a Loudon Litter Carrier, barn cleaning is made easy and pleasant work. Every farm needs this equipment. Manure may be taken directly from the stalls to the spreader or manure pit with but one handling and in half the time necessary by the old-fashioned method. Loaded cars may be raised and lowered



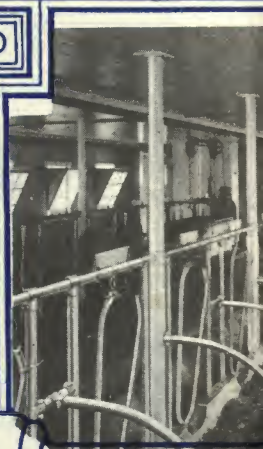
to any height by a small boy, and run out and emptied anywhere desired. Write today for detailed information and catalogs and lessen your winter barn work. Loudon Carriers are made in several different styles both for Steel and Wire Track.

LOUDEN MACH

ESTABLISHED
1867



Calf Stable with exercise court in center
at Homewood Farms



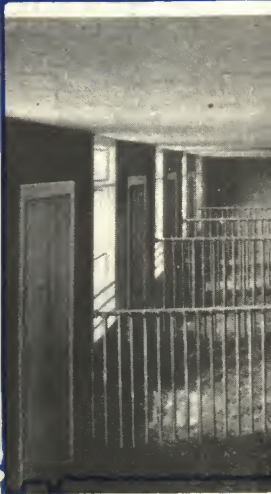
Main Dairy Barn, Homewood Farms
32 Loudon Stalls



The great barns of the Homewood Farms
the Loudon Architecture throughout
Owned by Wm. Butterworth



Test Barn at Homewood Farms. Loudon Pens
and Feed Carrier



Hospital Barn, Homewood Farms
used for Hospital and Bull

LOUDEN COMPANY

FAIRFIELD
IOWA



Cow Pens in Main Dairy Barn at Homewood Farms. Louden planned and equipped

Farms. In this building are Louden Box Stalls

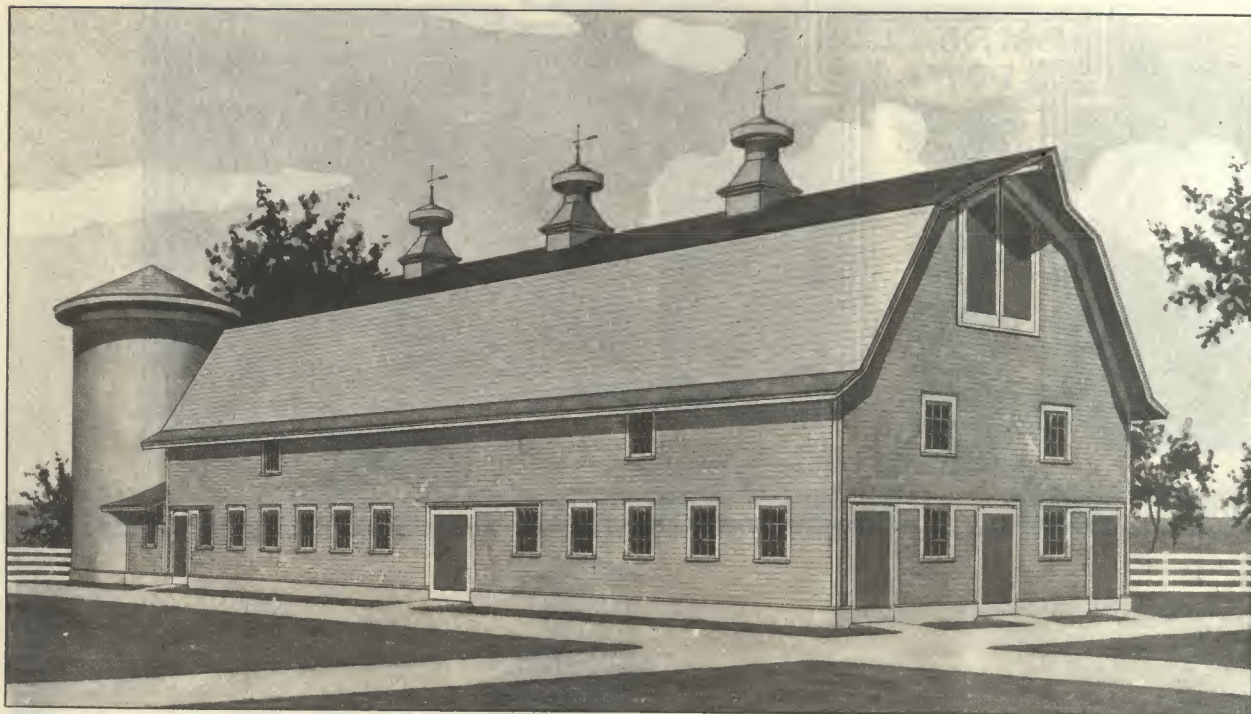


Farms, at Moline, Illinois, were planned by Louden, and were equipped by Louden Goods. Louden is President of Deere and Company

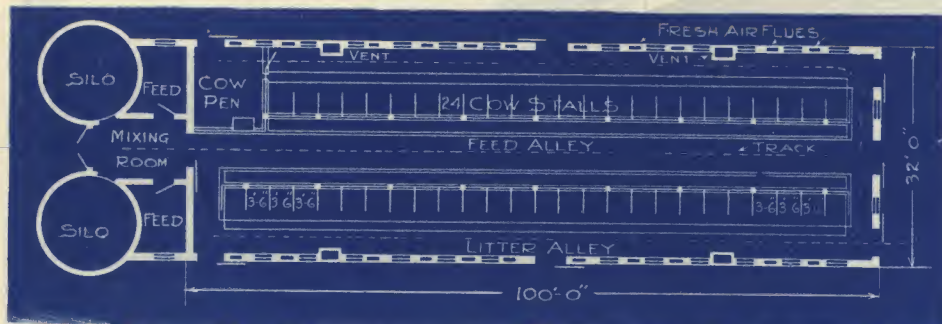


Louden planned and equipped Hog House at Homewood Farms

Farms—showing roomy Pens and Maternity Pens. far end



Design 2563—For 50 Cows



Description

This barn is 32 ft. wide by 100 ft. long.

The foundation wall extends 18 inches above the ground, and the frame sidewalls are 14 ft. high.

The lower story is 9 ft. high, the hay mow is 20 ft. high from floor to hay carrier-track, the

vertical sidewalls in the hay mow are 6 ft. high, and the ridge of roof is 33. ft. above the ground. The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction. Mow capacity, 95 tons loose hay. The barn above the foundation is of plank-frame construction and has a clear hay mow without posts. Estimated cost furnished upon application.

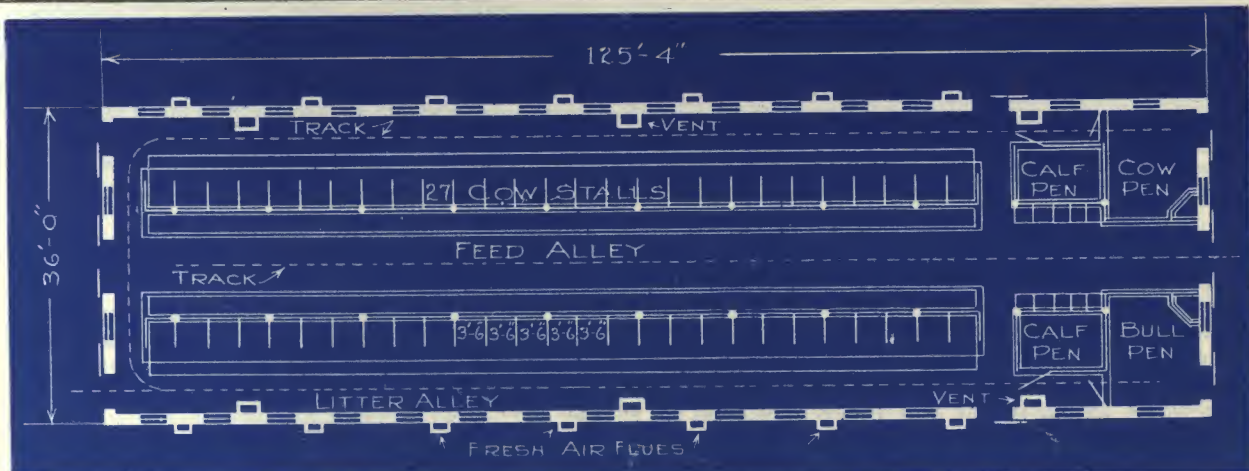
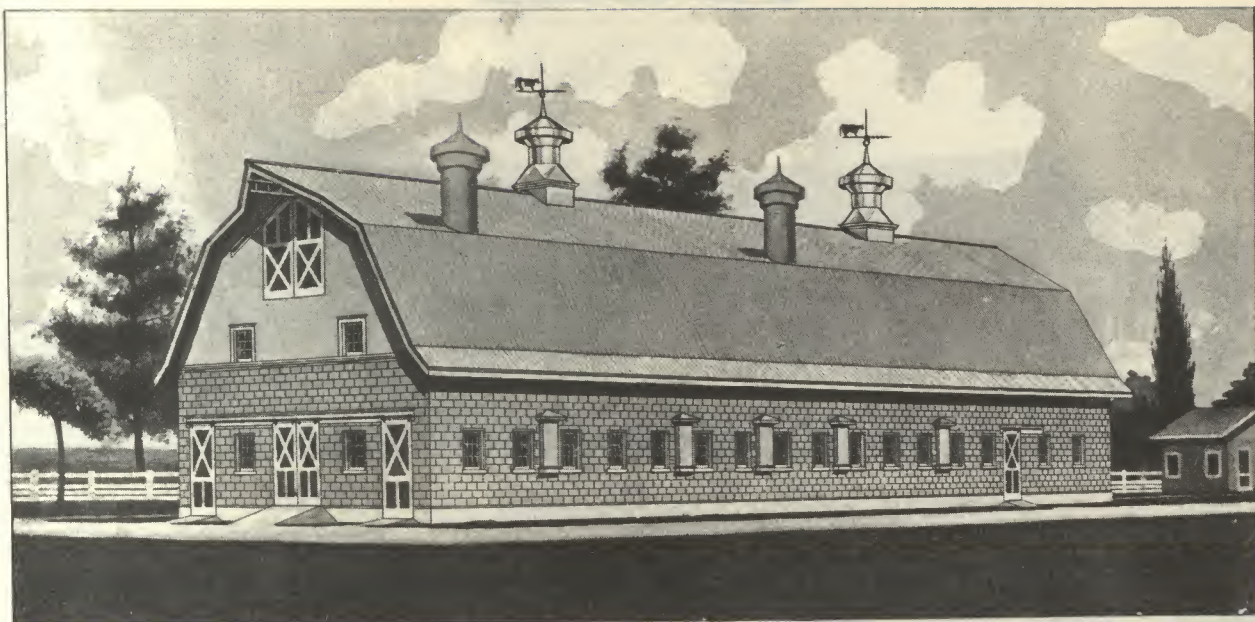
When to Cut the Ensilage

Water and Dry Matter in Corn at Different Periods

Date of cutting	Stage of growth	Corn per acre	Water per acre	Dry matter per acre
July 30	Fully tasseled	9.0	8.2	.8
August 9	Fully silked	12.9	11.3	1.5
August 21	Kernels watery to full milk	16.3	14.0	2.3
September 7	Kernels glazing	16.1	12.5	3.6
September 23	Ripe	14.2	10.2	4.0

Price of Complete working plans and specifications for Design 2563 \$5.00

In the last column is shown the dry matter per acre in corn at different stages. When the corn is fully tasseled, it contains but eight-tenths of a ton of dry matter per acre, or only one-fifth what it contains when fully ripe. When in the milk it contains nearly three times as much dry matter as when fully tasseled. Only seventeen days were occupied in passing from the milk to the glazing stage, yet in this time there was an increase in the dry matter of 1.3 tons per acre. This shows the great advantage of letting the corn stand until the kernels are glazed.



Design 2550—For 54 Cows

Description

This barn is 36 ft. wide by 125 ft. 4 in. long.

The concrete foundation wall extends 18 inches above the ground and the cement block sidewalls are 14 ft. high.

The lower story is 9 ft. high, the hay mow is 21 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 4 ft. high and the ridge of roof is 34 ft. above the ground.

The foundation wall is of concrete construction and the entire floor of the lower story is of concrete construction.

Mow capacity, 142 tons loose hay.

The barn above the mow floor is of braced rafter construction and has a clear hay mow without posts.

Estimated cost furnished upon application.

The key to sanitary dairy barn construction lies in the combining of the steel stall and stanchion construction together with impervious cement floors, plenty of light and proper ventilation.

This barn has been especially designed for concrete block or hollow tile wall construction and a timber roof covered with corrugated iron roofing.

It is very fire resisting from the exterior, durable and the hollow masonry walls give it good protection against extreme cold and hot weather.

**Price of Complete working
plans and specifications
for Design 2550 \$5.00**

If your neighbor is going to build tell him about this book—and do both him and us a good turn.



Design 2539—For 50 Cows and 6 Pens

Description

This barn is 40 ft. wide by 130 ft. long.

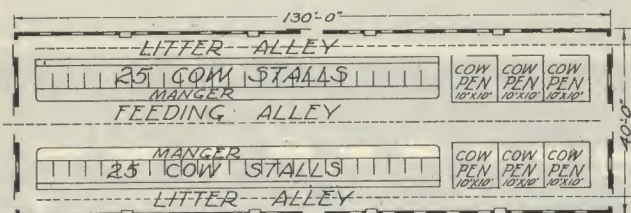
The foundation wall extends 18 inches above the ground and the frame sidewalls are 8 ft. high.

The story is 9½ ft. high, and the ridge of roof is 20 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the barn is of concrete construction.

The barn above the foundation is of plank-frame construction and has a clear span without posts.

Estimated cost furnished upon application.



In this particular stable the ceiling is self-supporting. A loft over a stable like this is not used for any purpose except as an air space, and the air is changed by having a window in each gable. The silos are placed between the stable and storage barn, with room for a feed carrier to pass through; this carrier track extends the whole length of the cow stable and runs far enough into the storage barn to load the litter carrier.

In a modern stable like this, it is possible to work in a great many conveniences that the men will appreciate when doing the work. Arrangements to save steps and hand labor a good many times a day will count up during the year.

Price of Complete working plans and specifications for Design 2539 \$5.00

Average Periods of Gestation

The period of gestation in animals varies considerably, but the following is an average period based on a long series of observations:

Ass.....	12 months	Pig.....	3½ months
Mare.....	11 months	Bitch.....	9 weeks
Cow.....	9 months	Cat.....	8 weeks
Sheep.....	5 months	Rabbit.....	30 days
Goat.....	5 months	Guinea pig.....	65 days

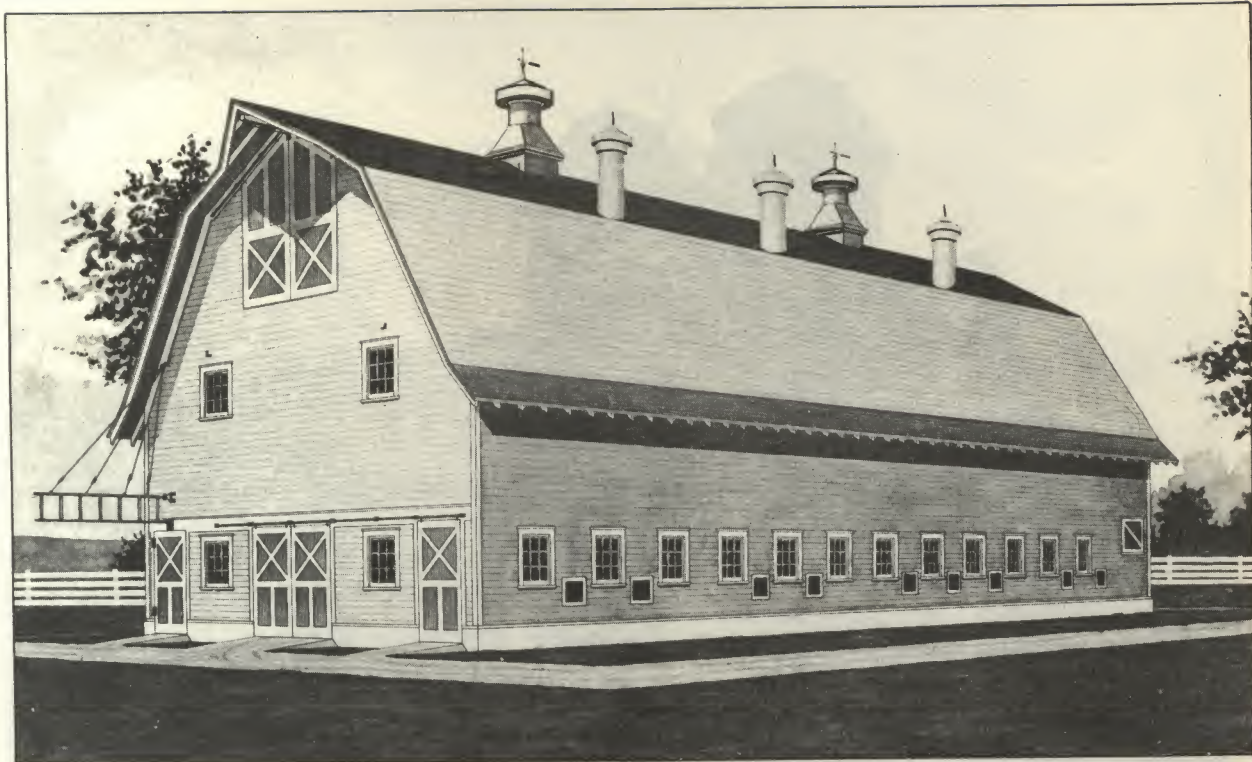
Louden Machinery Company,
 Gentlemen:

Your stanchions are the greatest thing to tie cows with that ever was manufactured. The cows can lie down comfortably when tied with them and stand more quietly while being milked.

As to strength, I have tied cows that weighed up to 1500 lbs. that had never been tied, and they certainly gave them a thorough test. Have used them 2 years and have had no expense whatever.

Yours very truly,
 H. F. Hoferkamp.

Mattoon, Ill.

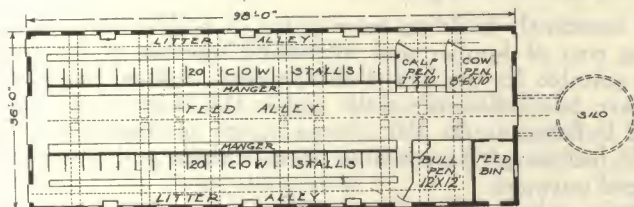


Design 2561—For 40 Cows

Description

This barn is 36 ft. wide by 98 ft. long. The foundation wall extends 18 inches above the ground, and the frame sidewalls are 16 ft. high.

The lower story is 9 ft. high, the hay mow is 24 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 7 ft. high, and the ridge of roof is 37 ft. above the ground.



The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 120 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.

Price of Complete working plans and specifications for Design 2561 \$5.00

A good farm deserves good buildings.

Any farm is good that provides a living for the family.

Comfortable buildings help to make a poor farm good and a good farm better.

Even the land that has been ruined and "turned out to the Lord" may be brought back to life by the aid of live stock; but first you must have buildings and fences to make the live stock comfortable.

Each farm is shy a building or two, and most farms need more fencing. Fences for range, health and pasture; barns and stables for storage and winter feeding.

Economy in business often means spending money for necessary improvements.

If animals require all their feed to keep them alive and warm, then the grain is being burned for fuel, while the animals are marking time. Time may not be much of an object to the animal, but it is to the owner.



Design 7990 for 51 Cows

Breeders are constantly building more barns of hollow tile because of the increasing cost of lumber and increasing number of factories producing a tile suitable for use in the construction of farm buildings.

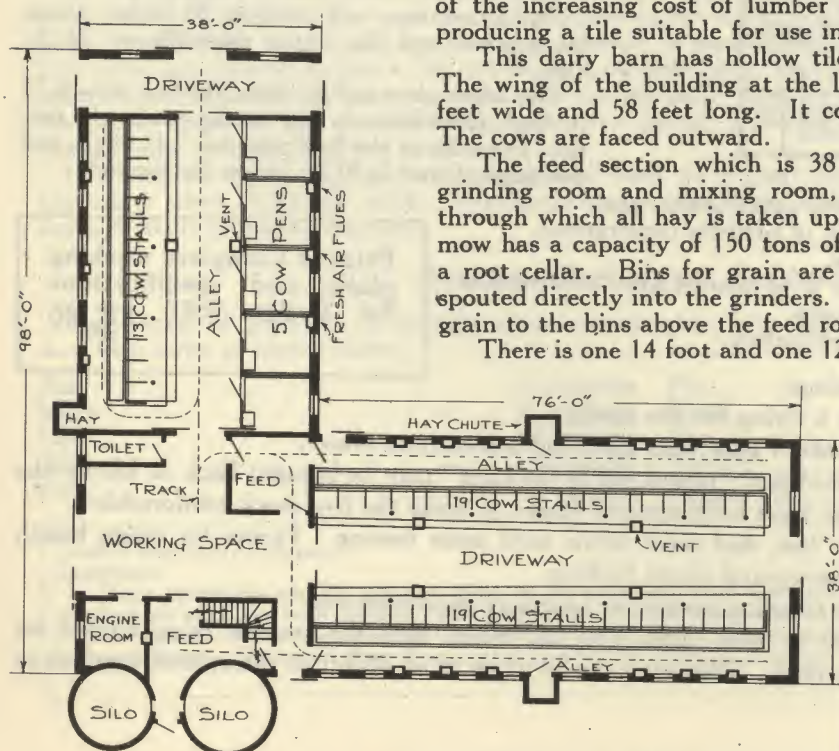
This dairy barn has hollow tile walls and is the shape of an "L." The wing of the building at the left, shown in the photograph, is 38 feet wide and 58 feet long. It contains 13 cow stalls and five pens. The cows are faced outward.

The feed section which is 38 feet square contains engine room, grinding room and mixing room, and an opening to the mow floor through which all hay is taken up for both sections of the barn. The mow has a capacity of 150 tons of loose hay. Below the feed room is a root cellar. Bins for grain are on the second floor. Grain can be spouted directly into the grinders. An elevator with floor dump carries grain to the bins above the feed room.

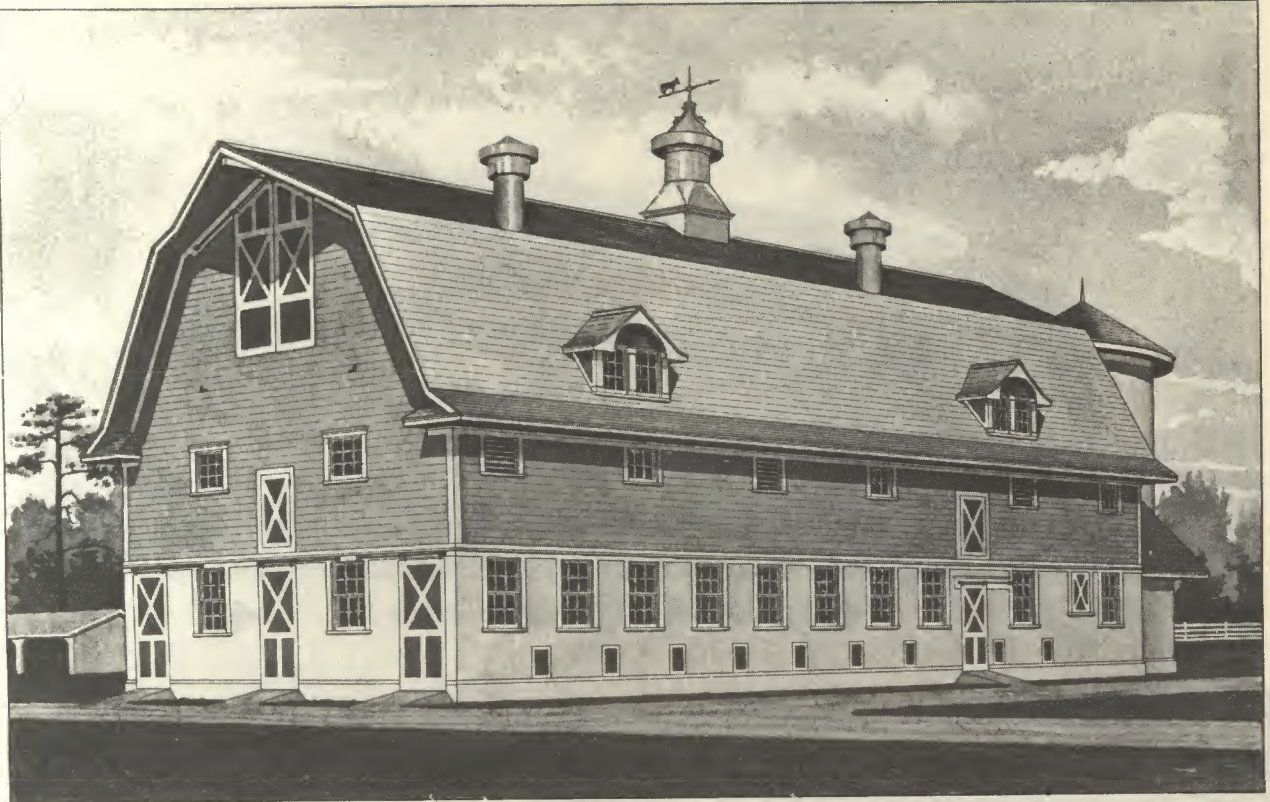
There is one 14 foot and one 12 foot silo.

The right wing contains stalls for 38 cows and is separated from the feed section by a tile wall. It is 38 feet wide by 76 feet long.

This dairy barn is a very complete plant for feeding and caring for dairy cows so that they will produce the maximum amount of milk.



Price of Complete Working
 Plans and Specifications for
 design 7990 **\$15.00**



Design 1619—For 30 Cows

Description

This barn is 34 ft. wide by 86 ft. long.

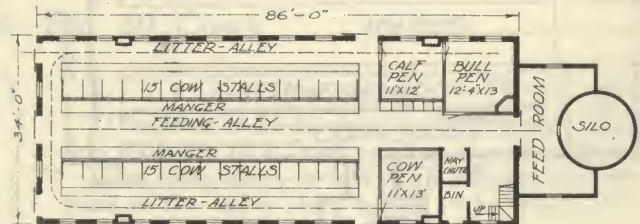
The lower story is 9 ft. high, the hay mow is 25 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 9 ft. high, and the ridge of roof is 37 ft. above the ground.

The foundation wall is of concrete construction, and the entire lower story is of concrete construction. Mow capacity, 110 tons loose hay.

The barn above the basement wall is of plank-frame construction, and has a clear hay mow without posts.

Estimated cost furnished upon application.

Besides stalls for thirty cows, this barn has three large pens, one for six calves, one for bull, and one for cow or young stock. These pens extend from the center feed alley to the outside walls which makes them a good size. The hay chute can be enclosed with door to make it dust proof.



Price of Complete working plans and specifications for Design 1619 \$5.00

Louden Machinery Company,
 Gentlemen:

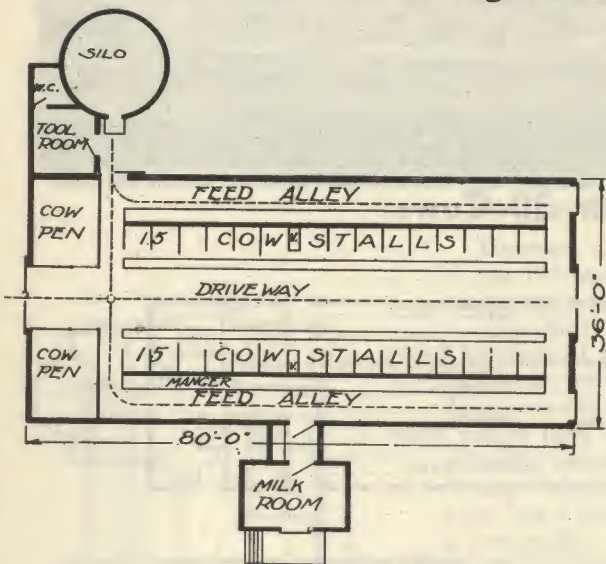
The Louden goods used by the Iowa State College, consisting of litter carriers, hay tools, stalls and stanchions, have proven to be very satisfactory and have proven to be all that you claim for them. We have used more or less of your equipment for many years and find that the cost of repairs has been exceedingly low.

Trusting this may be of interest to you, we are

Very truly yours, Department of Agricultural Engineering,
 By J. B. Davidson, Professor of Agricultural Engineering.
 Iowa State College, Ames, Iowa.



Design 2419—For 30 Cows
 2 Pens



Description

This barn is 36 ft. wide by 80 ft. long.

The foundation wall extends 36 inches above the floor, and the frame sidewalls are 6½ ft. high.

The story is 9 ft. high, and the ridge of roof is 22 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the barn is of concrete construction.

The barn above the foundation is of plank-frame construction and has a clear span without posts.

Estimated cost furnished upon application.

**Price of Complete working
 plans and specifications
 for Design 2419 \$5.00**

In this plan the cows are headed out, and there is a driveway through the center. The bedding is brought in by the wagon load through the same channel. Even when the storage barn is handy a wagon is often used for this purpose. If either of the box cow pens are not in use, the extra bedding is pitched in there until wanted.

There is an over-head track which runs to the silo to carry silage at feeding time. The same track is supposed to run to the storage barn for alfalfa or other roughage.

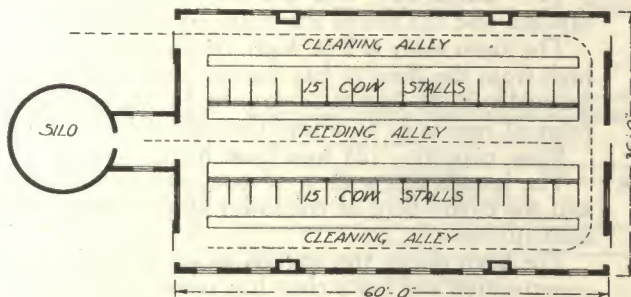
The Loudon Machinery Co.,
 Gentlemen:

The Feed Carrier outfit I purchased from you has given entire satisfaction. I have used it for the past two winters and have never had a break. I can highly recommend it to anyone in need of a feed carrier.

Yours truly, J. W. Sanborn, Spring Grove, Ill.



Design 2140—For 30 Cows



**Price of Complete working
 plans and specifications
 for Design 2140 \$5.00**

Description

This barn is 36 ft. wide by 60 ft. long. The side walls are 10 ft. high and top of roof is 32 ft. The lower story is 9 ft. high and hay carrier track in the upper story hangs 19 ft. above the mow floor.

The construction consists of a plank frame with self-supporting roof, having a clear hay mow without posts.

Mow capacity, 48 tons loose hay.

The foundation wall is of concrete extending above the dampness of the ground and the lower floor is of cement with cement mangers, gutters, etc.

This barn contains 30 cow stalls facing a center feed alley running lengthwise of the building to the silo at one end.

Estimated cost furnished upon application.

Gentlemen:

About six years ago I rebuilt my stable putting in some of your equipment and some of another make. Two years later I changed it to all Louden equipment and am very well satisfied. After six years constant use it is still strong enough to hold our biggest Holsteins.

Yours truly,

F. H. Case, Guilderland, N. Y.



Design 2929—For 30 Cows and Box Pens

Description

This barn is 36 ft. wide by 100 ft. long. The foundation wall extends 5 ft. above the ground, and the frame sidewalls are 20 ft. high.

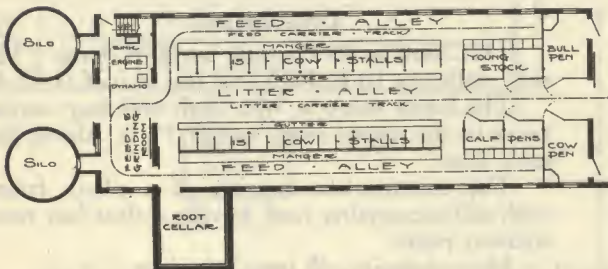
The lower story is 8 ft. high, the hay mow is 31 ft. high from the floor to hay carrier-track, the vertical sidewalls in the hay mow are 16 ft. high, and the ridge of roof is 43 ft. above the ground.

Mow capacity, 124 tons loose hay.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.



Louden Machinery Co.,
 Sirs:

About twelve years ago I put a Louden hay carrier and track in my barn, and six years later a Louden litter carrier and track in basement of barn. They have both given the best of satisfaction. It is the only satisfactory way for getting the manure from a basement barn. Four years ago I built a silo and installed a feed carrier on the track in basement. It is convenient and a labor saver, as I feed ensilage both inside the barn and in the bunks outside of it. It beats carrying ensilage in a basket or cleaning stables on a wheelbarrow.

Yours respectfully,

W. F. Desenberg, Norwalk, Iowa.

**Price of Complete working
 plans and specifications
 for Design 2929 \$5.00**



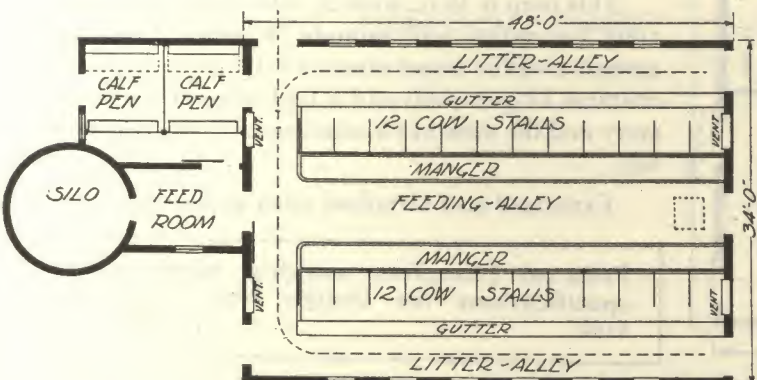
Exterior View of Dairy Barn Designed for Summit Farm, Adams County, Neb.

Mrs. Anne V. Ward, Owner

We have planned seven other buildings for this same farm.

Design 3643—For 24 Cows

2 Pens



Description

This barn is 34 ft. wide by 48 ft. long. The side walls are 14 ft. high and top of roof is 34 ft.

The lower story is 8 ft. high and hay carrier track in the upper story hangs 23 ft. above the mow floor.

The construction consists of a plank frame with self-supporting roof, having a clear hay mow without posts.

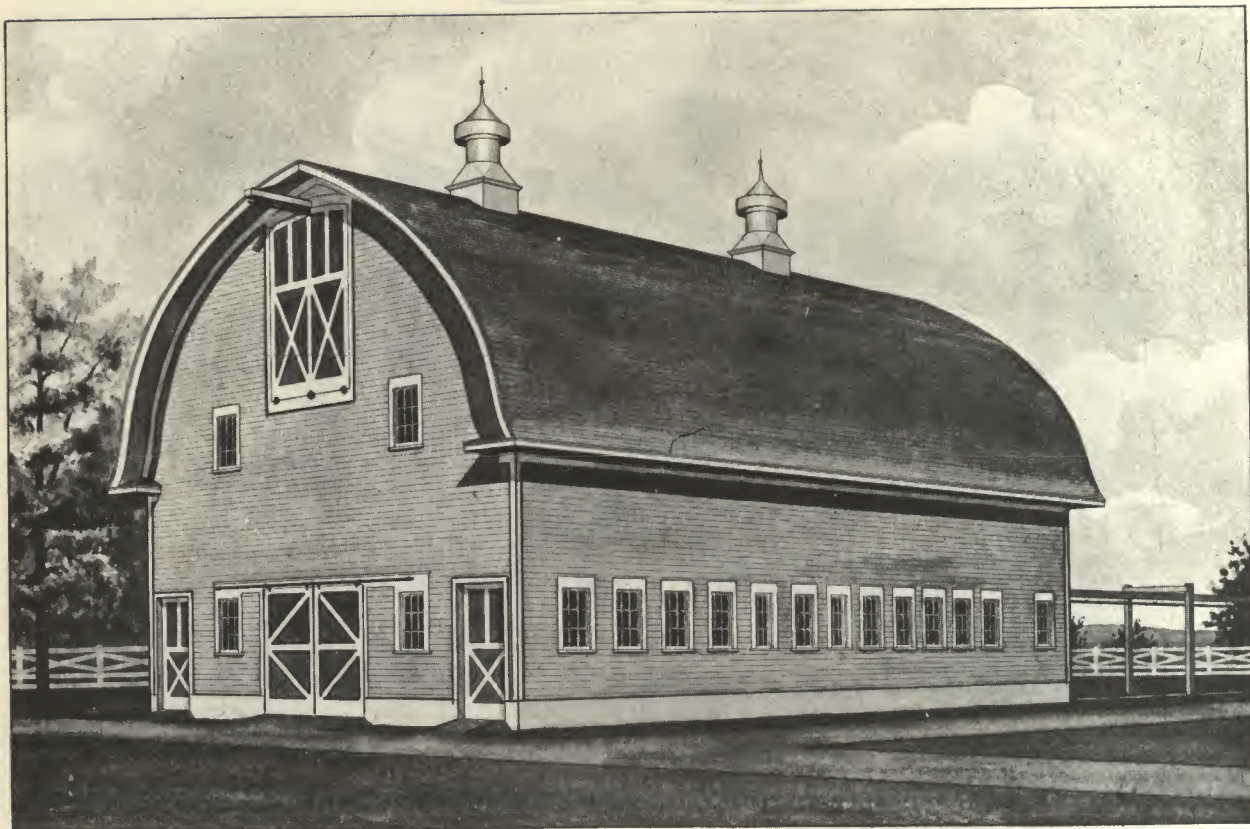
Mow capacity, 48 tons loose hay.

The foundation wall is of concrete extending above the dampness of the ground and the lower floor is of cement with cement mangers, gutters, etc.

This barn contains 24 cow stalls facing a center feed alley running lengthwise of the building to the silo at one end.

Estimated cost furnished upon application.

Price of Complete working plans and specifications for Design 3643. **\$5.00**



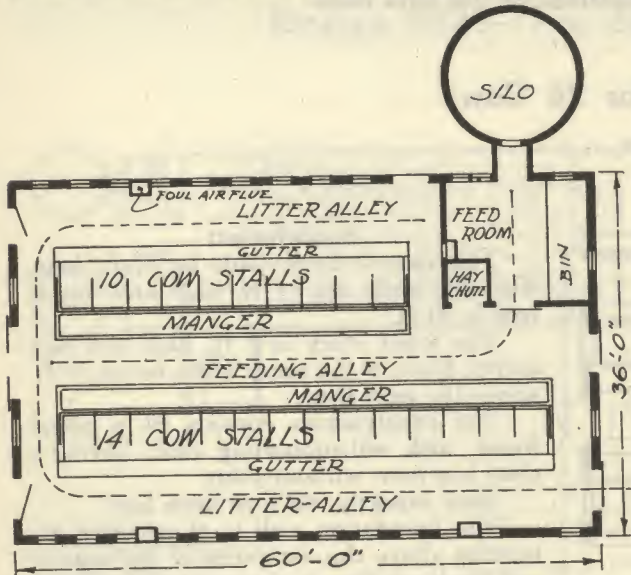
Design 8160—For 24 Cows

This barn is designed according to construction type "O", as explained on page 18, and is arranged similar to standard arrangement type "U", as explained on page 41

This barn is 36 ft. wide by 60 ft. long. The concrete foundation wall extends 18 inches above the ground and the lower story is 8 ft. 6 in. high. It contains 24 cow stalls and a feed room in the lower story and the mow has a capacity of 75 tons of loose hay.

Estimated cost furnished upon application.

Price of Complete working plans and specifications for Design No. 8160..... **\$5.00**



The Loudon Machinery Co.,
 Fairfield, Iowa.

Gentlemen:

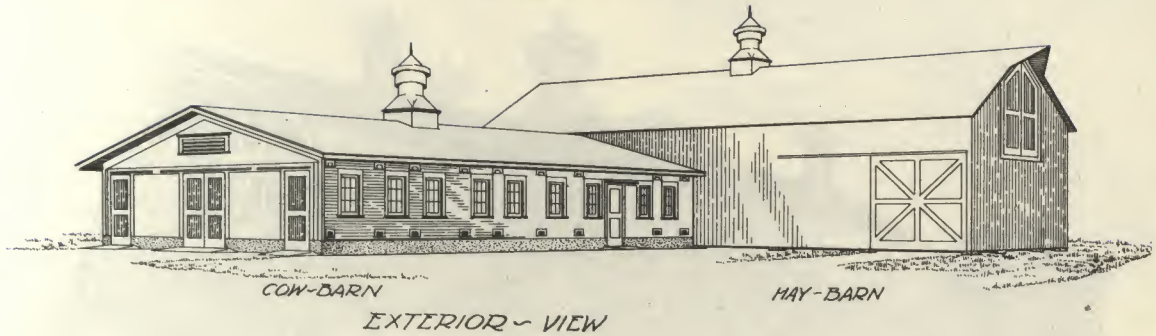
I wish to say this (unsolicited) for the benefit of every farmer in America, if you want to save time in harvest, get a Giant Balance Grapple Hay Fork. I have used several different makes but the Giant Grapple as made by The Loudon Company beats them all.

It will do all that any of them will do and more. I unload long and short hay, wheat, oats, corn fodder, corn bundles, corn shocks, and straw of any kind. It will take a hold of all of the hay that two horses can lift. Yet is handier than hay slings. I have tried different sizes but the Giant is none too large for all kinds of work; smaller sizes are too small. You can send the Giant out on trial without the least danger of it ever coming back.

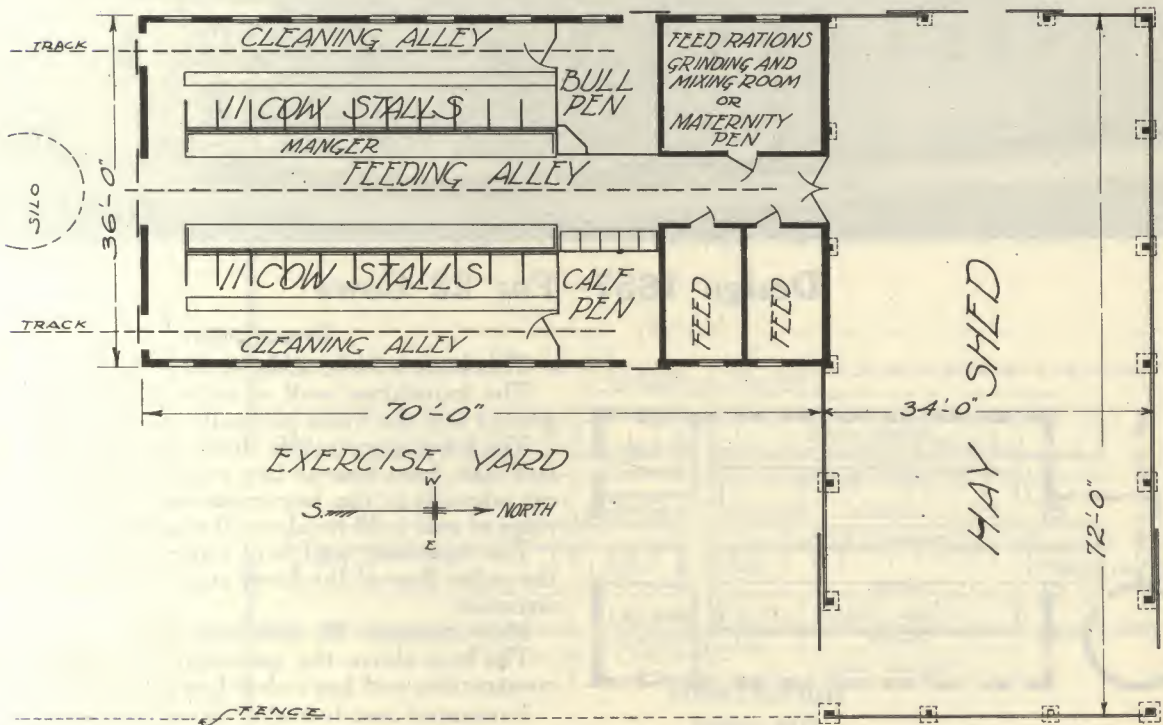
Yours truly,
 H. A. SIMONS.

Warren, Ohio, March 4, 1918

Design 4929



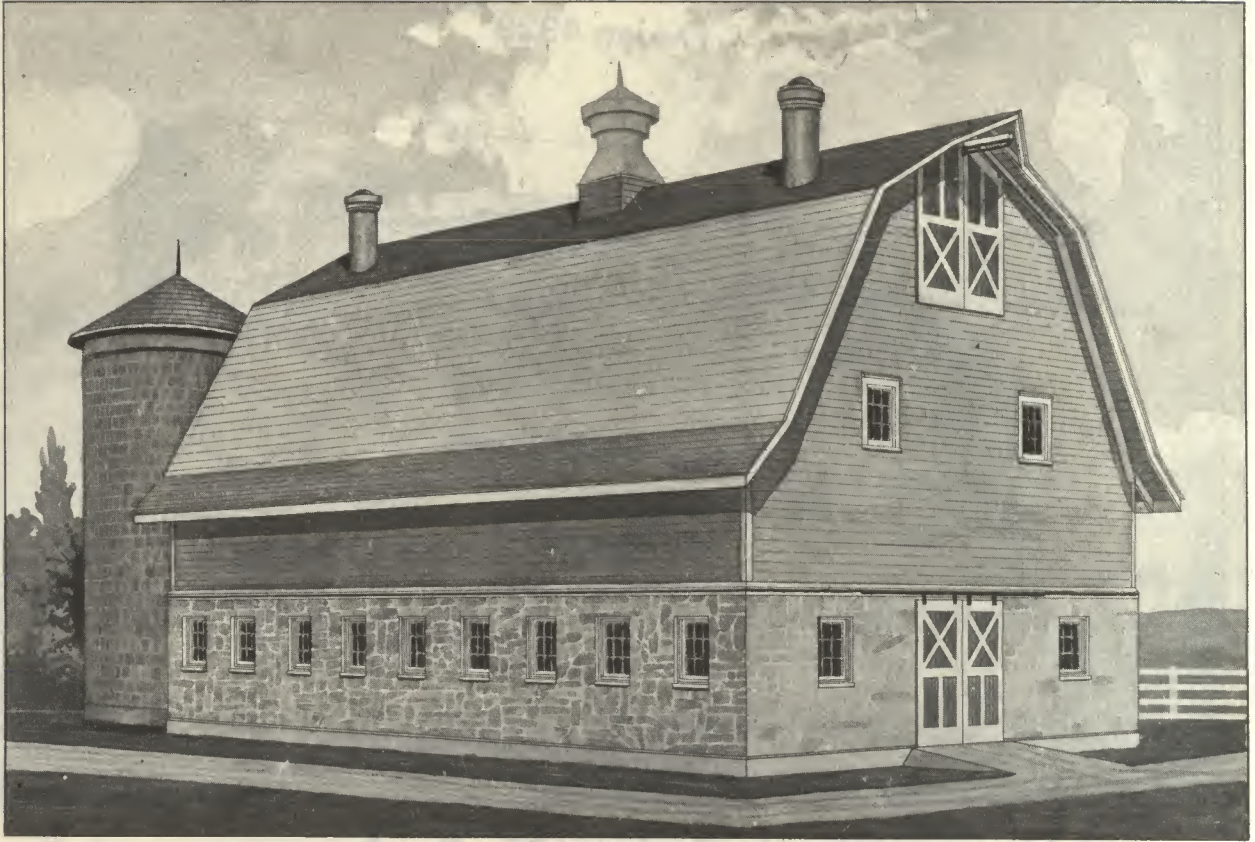
This Type of Barn can be Built much Cheaper than a Two-story Barn of the same Capacity.



FOR 22 COWS

Estimated cost of both the hay barn and cow barn together with all other details concerning this arrangement will be cheerfully furnished upon application.

Price of Complete working plans and specifications for Design 4929 **\$5.00**



Design 1657—For 22 Cows

Description

This barn is 36 ft. wide by 60 ft. long.

The foundation wall extends 10 ft. above the ground and the frame sidewalls are 8 ft. high.

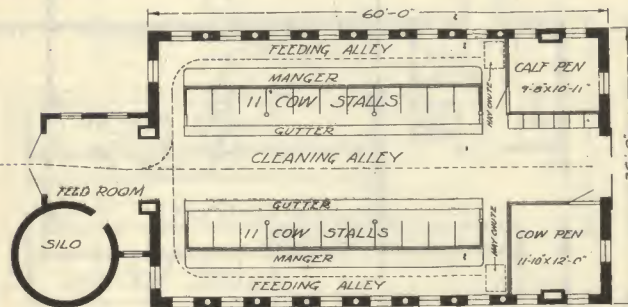
The lower story is 9 ft. high, the hay mow is 25 feet high, from floor to hay carrier track, the vertical sidewalls in the hay mow are 7 ft. high and the ridge of roof is 38 ft. above the ground.

The basement wall is of stone construction and the entire floor of the lower story is of concrete construction.

Mow capacity 80 tons loose hay.

The barn above the basement is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.



This barn has a center driveway running the full length of it with a door at both ends wide enough to admit a manure spreader. There is a hay chute over each feed alley and a feed carrier track running to the silo.

Price for Complete working plans and specifications of Design 1657..... \$5.00

Dear Sirs:

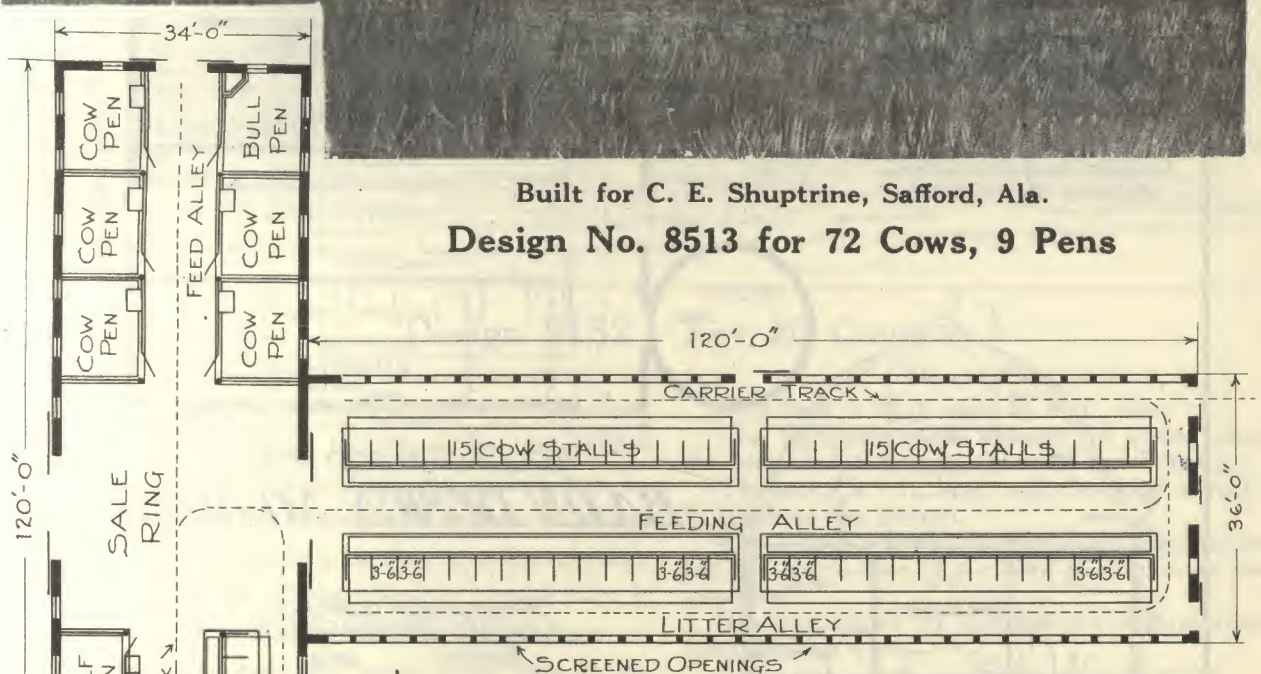
Will say in reference to the Loudon Stanchions that they have given perfect satisfaction. Would not do without them for twice what they cost.

Respectfully,

W. A. McKENZIE, Springville, Utah



Built for C. E. Shuptrine, Safford, Ala.
Design No. 8513 for 72 Cows, 9 Pens



Description

Design 8513

This barn was designed for Mr. C. E. Shuptrine, breeder of thoroughbred Jersey cattle at Safford, Alabama, and has proved to be admirably adapted to southern conditions.

The barn is in two sections. The main section is 34 feet wide by 120 feet long. It has a central sales ring with 12 stalls and 3 calf pens on one side and 5 cow pens and 1 bull pen on the other. The mow has a loose hay capacity of 100 tons. The one story dairy section is 36 feet wide by 120 feet long and has stalls and stanchions for 60 cows.

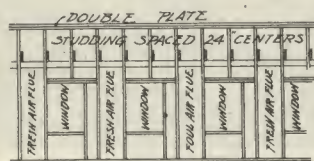
The main barn is of the braced rafter type of construction. The floor is of concrete. The windows in the dairy section are numerous and screened to give ample ventilation in warm weather and to protect against flies.



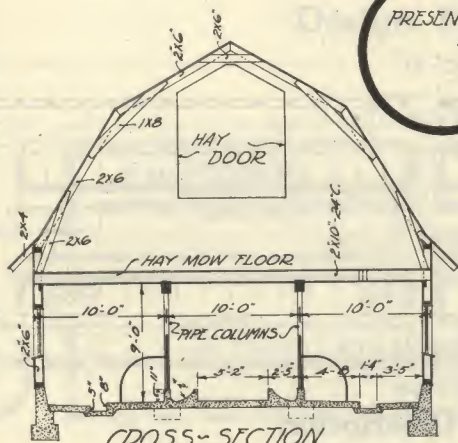
BILL OF MATERIALS

170 SACKS CEMENT
 22 YDS SAND
 37 YDS GRAVEL
 4 PIPE COLUMNS 3 1/2" X 8'-6"
 8 SILLS 2" X 6'-16"
 8 " 2" X 6'-14"
 10 PLATES 2" X 6'-16"
 4 " 2" X 10'-16"
 4 " 2" X 10'-14"
 32 STUDDING 2" X 6'-10"
 24 " 2" X 6'-14"
 6 RIBBONS 2" X 6'-14"
 24 GIRDERS 2" X 10'-14"
 42 JOIST 2" X 10'-16"
 32 BRIDGING 2" X 4'-12"
 44 RAFTERS 2" X 6'-12"
 44 " 2" X 6'-10"
 44 LOOKOUTS 2" X 4'-4"
 38 BRACES 2" X 6'-6"
 76 " 1" X 8'-8"
 19 COLLAR BEAMS 2" X 6'-4"
 2,150' DROP SIDING 1" X 6"
 14,000' 1" X 6" PLG. FOR INTERIOR SIDE WALLS
 14,000' 1" X 6" PLG. FOR MOH FLOOR
 15,000' 98' DECKED CEILING
 15,000' 1" X 6" SHEATHING
 20,000 SHINGLES
 350 FT. CYPRESS, FINISH, CORNERS, ETC.
 10 SASH 9' 11" X 12" & FRAMES COMPLETE
 1-24' LOUDEN CUPOLA

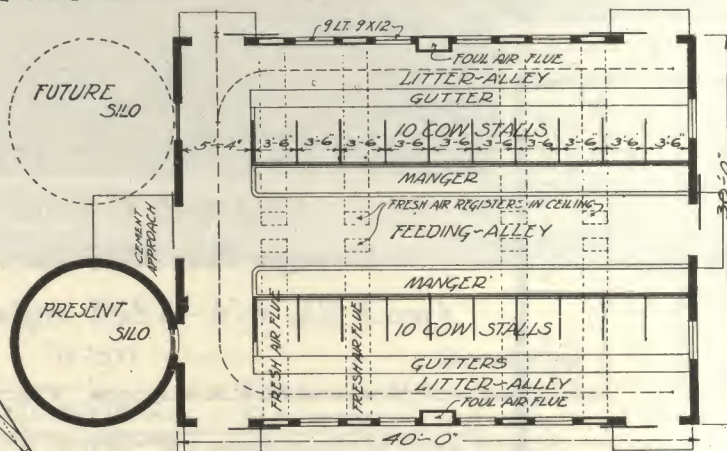
EXTERIOR~PERSPECTIVE~VIEW



FRAMING OF SIDE WALLS



CROSS~SECTION



GROUND~FLOOR~PLAN

BARN DESIGN NO. 5029

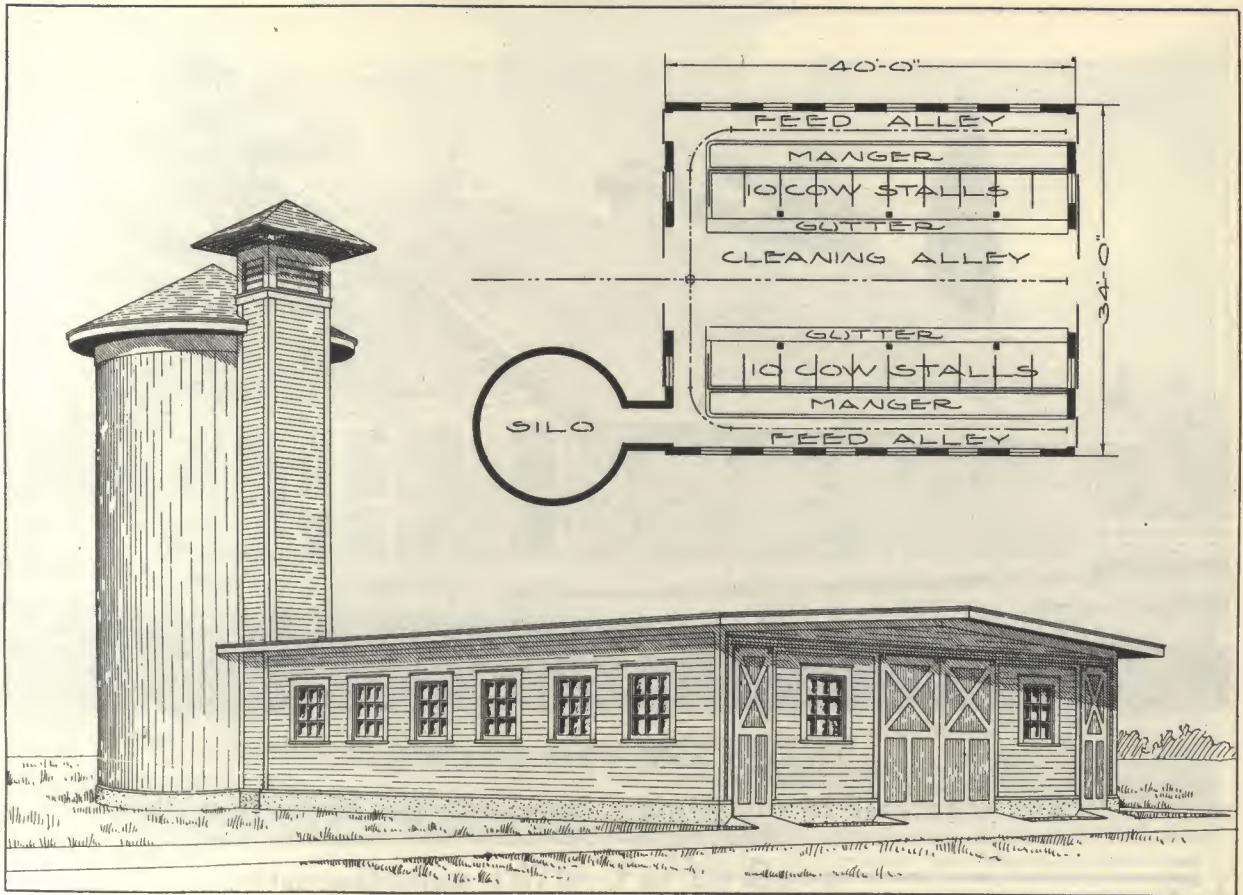
ARCHITECTURAL DEPARTMENT
 LOUDEN MACHINERY CO.
 FAIRFIELD, IOWA.

Design 5029

The braced rafter construction of this roof is the most practical and economical ever designed for a clear span mow, having no posts, trusses or beams to interfere with the hay.

With this type of construction the cows may be faced in or out, as preferred. The King system of ventilation is used.

If you prefer this type of barn, but require a greater capacity than the plan shows, you can figure the length of the barn you require by adding 3 1/2 feet in length for every two additional cows you wish to house. Complete working plans and specifications, \$5.00 per set.



Design 3152 — For 20 Cows

Description

In this plan the cows are headed out, and there is a driveway through the center for the manure spreader, so the manure from the gutters may be loaded and hauled to the field with only one handling. The bedding is brought in by the wagon load through the same channel. Even when the storage barn is handy, a wagon is often used for this purpose.

There is an over-head track which runs to the silo to carry silage at feeding time. The same track is supposed to run to the storage barn for alfalfa or other roughage.

This barn is 34 ft. wide by 40 ft. long. The foundation wall extends 18 inches above the floor, and the frame sidewalls are 9 ft. high. The story is 9 ft. high, and the ridge of roof is 12 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the barn is of concrete construction.

The barn above the foundation is of plank-frame construction.

Estimated cost furnished upon application.

**Price of Complete working
 plans and specifications
 for Design 3152 \$5.00**

Dear Sirs:

In 1911 I purchased a six tine balance grapple fork of you with track and carrier. Since then I have bought more of your barn equipment. All have, and are giving, the very best of service and I shall always remember you when in need of anything in your line.

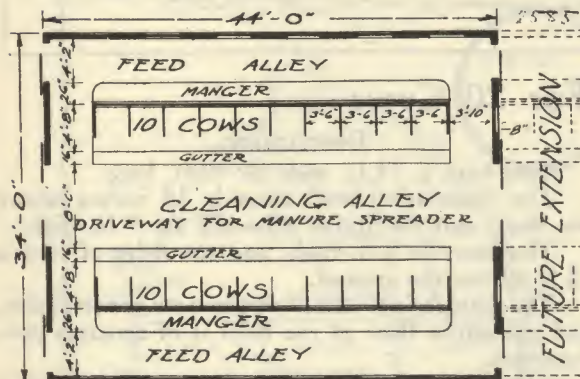
Very truly,

N. L. Kingsley, Edinboro, Pa.



Design 2585—For 20 Cows

A barn adaptable to any climate, especially the South and West



Description

This barn is 34 ft. wide by 44 ft. long.

The foundation wall extends 18 inches above the ground and the frame side walls are 8 ft. high.

The story is 9 ft. high.

The foundation wall is of concrete construction and the entire floor is of concrete construction.

The barn above the foundation is of plank-frame construction and has a clear span without posts.

Estimated cost furnished upon application.

Price of Complete working
plans and specifications for
Design 2585 **\$5.00**





Design 1675—For 20 Cows

Description

This barn is 34 ft. wide by 72 ft. long.

The foundation wall extends 18 inches above the ground, and the frame sidewalls are 14 ft. high.

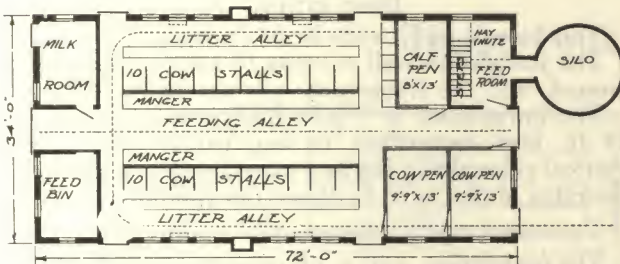
The lower story is 9 ft. high, the hay mow is 21 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 5 ft. high, and the ridge of roof is 34 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 80 tons loose hay.

The barn above the foundation is of plank frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.



While the dairy barn should be located where it will be most convenient for the handling of stock, feed, litter, and milk, it should also be arranged to suit its location. This barn suits a certain location and makes a good design where the silo is on the same end as the entrance for litter carrier and where milk and hay is handled at the other end.

**Price of Complete working
 plans and specifications
 for Design 1675 \$5.00**

Gentlemen:

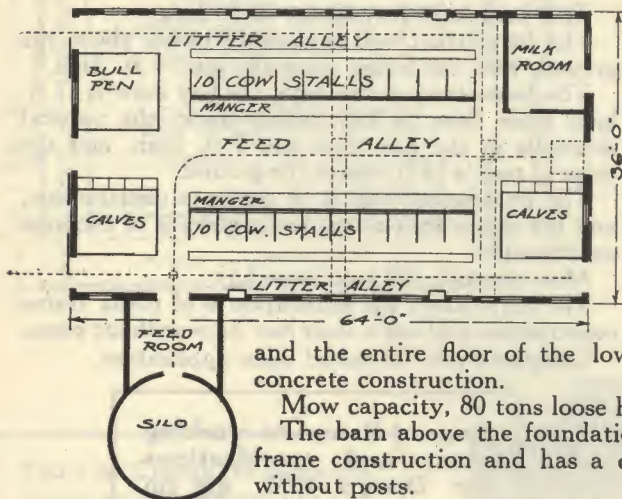
The Loudon Stanchions that we purchased from you for our new certified dairy cow barns are a great success. They are neat and handy in their working and fill the requirements in every respect. We have frequent occasion to recommend them strongly to others who are constructing up-to-date dairy buildings, and certainly would buy them again in equipping dairy buildings.

Yours very truly,

E. L. Thompson, Pres.,
 Clover Hill Farms, Portland, Ore.



Design 2556—For 20 Cows



Description

This barn is 36 ft. wide by 64 ft. long.
 The foundation wall extends 18 inches above the ground, and the frame sidewalls are 16 ft. high.
 The lower story is 9½ ft. high, the hay mow is 24 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 6 ft. high, and the ridge of roof is 37 ft. above the ground.

Estimated cost furnished upon application.

The foundation wall is of concrete construction,

**Price of Complete working
 plans and specifications
 for Design 2556 \$5.00**

and the entire floor of the lower story is of concrete construction.

Mow capacity, 80 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

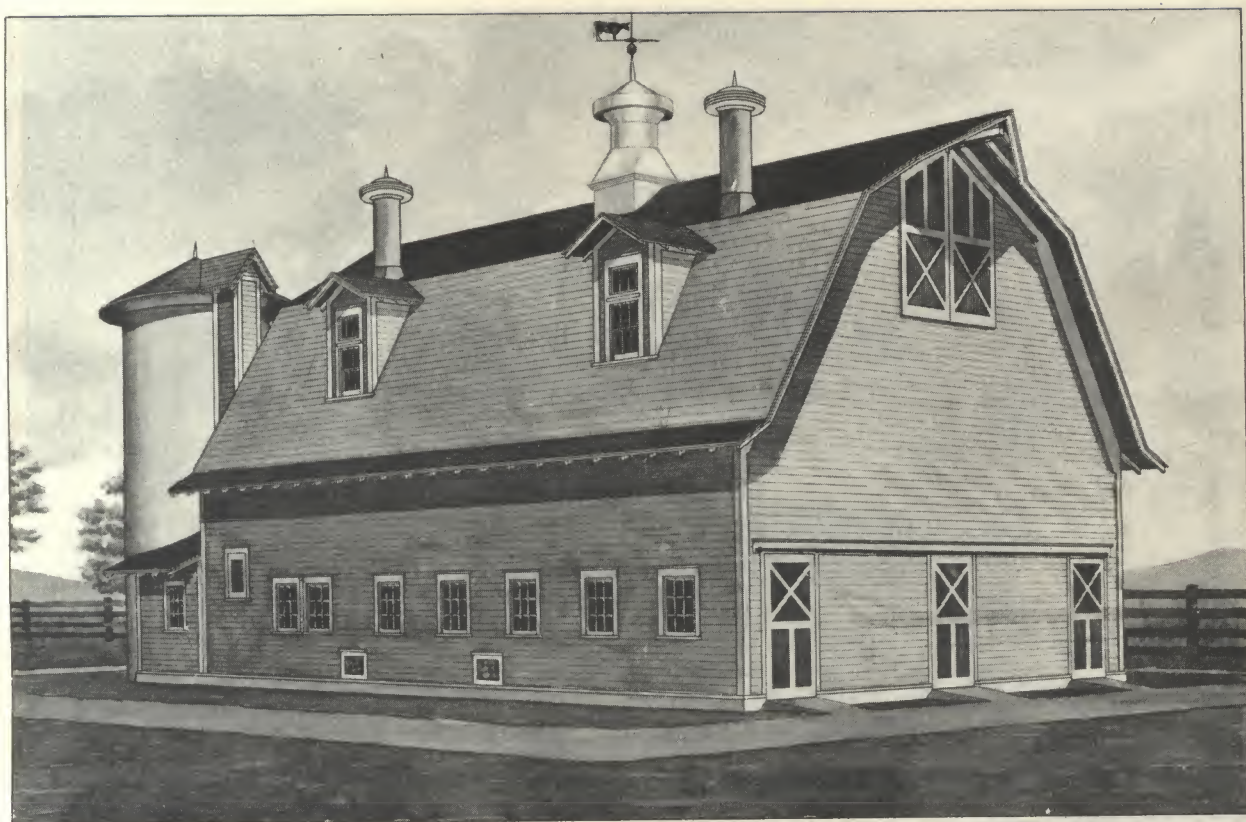
We can furnish complete blue-prints for any building illustrated in this book.

Louden Machinery Co.

Dear Sirs: Last Fall we remodeled our stables fitting them out with the Louden steel stalls, and can recommend them as being easy to operate, impossible for the cattle to unlock, and perfectly satisfactory in every respect. The mangers too, we built after your plan, and find they answer a double purpose, as they not only eat from them, but they drink from them as well, it having been inconvenient to install water basins on account of the cold weather.

Yours truly,

M. L. Haley,
 Springfield, Ontario.



Design 1602—For 20 Cows

Description

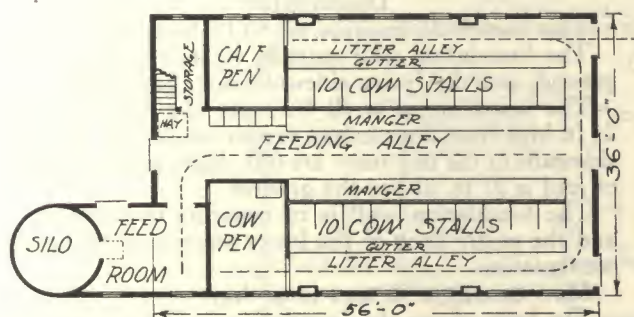
This barn is 36 ft. wide by 56 ft. long.
 The frame sidewalls are 14 ft. high.

The lower story is 9 ft. high, the hay mow is 22 ft. high from floor to hay carrier-track, and the ridge of roof is 34 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.



The second story has a capacity for 60 tons of loose hay and space for additional bins if they should be wanted.

Special attention has been given this design as to light and ventilation.

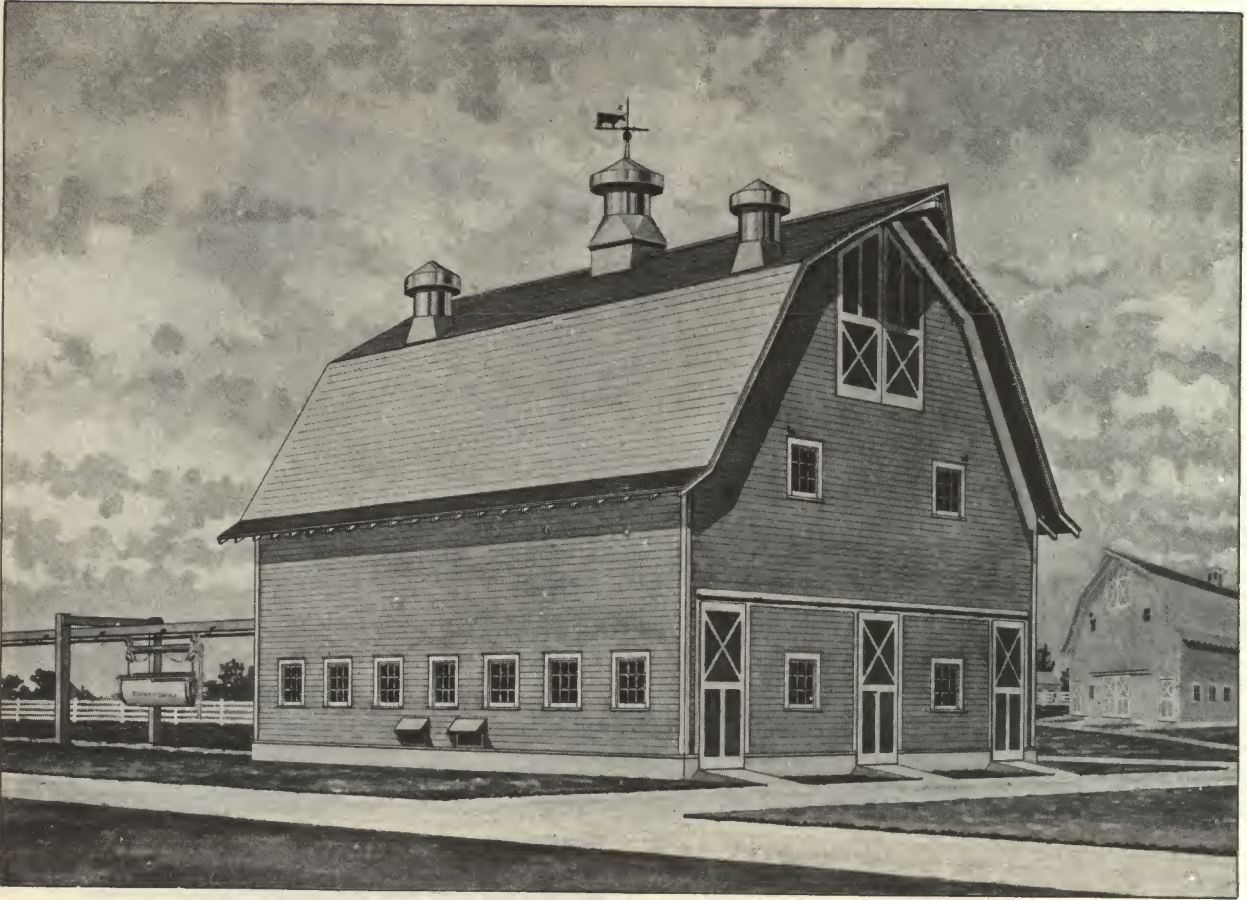
Price of Complete working plans and specifications for Design 1602 \$5.00

Louden Machinery Company,

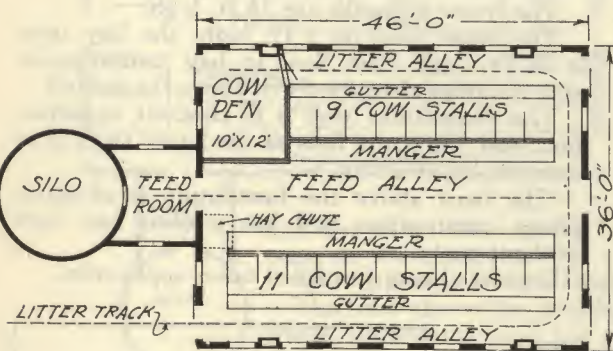
Gentlemen: After trying different tracks and hangers on my heavy barn door, I am satisfied with the Loudon.

Yours truly

(Signed) SAMUEL H. MARTIN, Whitewood, South Dakota



Design 2562—For 20 Cows



Description

This barn is 36 ft. wide by 46 ft. long.

The foundation wall extends 18 inches above the ground, and the frame sidewalls are 16 ft. high.

The lower story is 10 ft. high, the hay mow is 24 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 6 ft. high, and the ridge of roof is 37 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

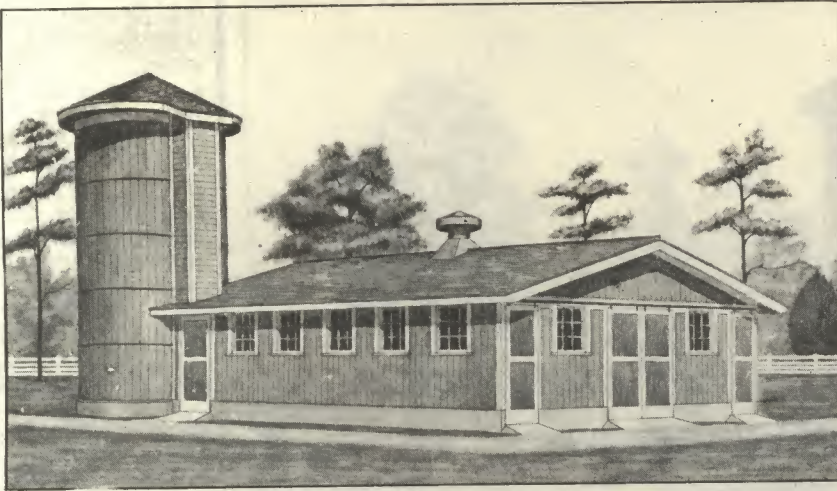
Mow capacity, 55 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.

The man who keeps good stock and builds good buildings to house them, is the man to succeed and build up a business that will give him an enviable reputation that will reach far beyond the county in which he lives.

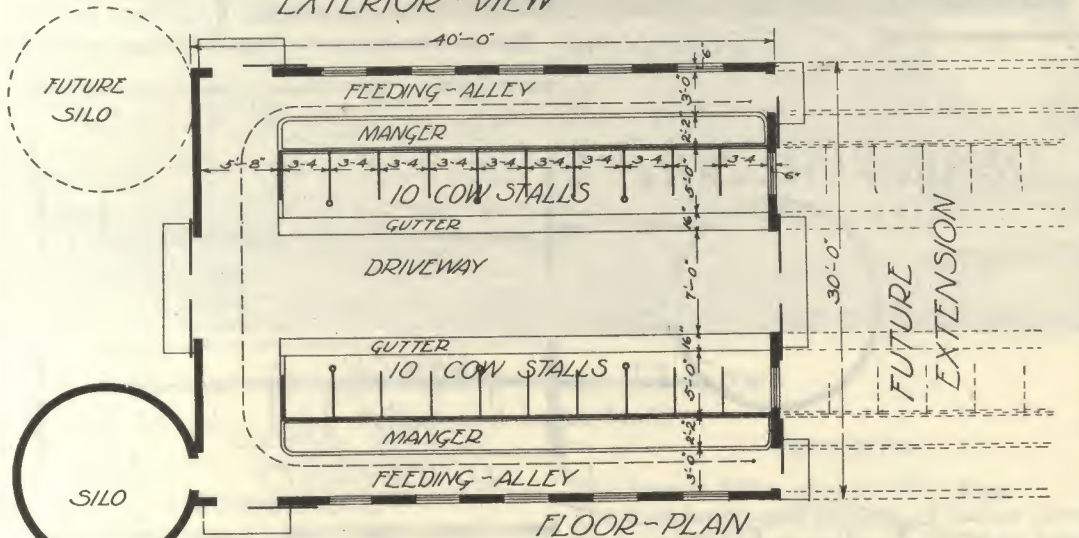
Price of Complete working plans and specifications for Design 2562 \$5.00



EXTERIOR-VIEW

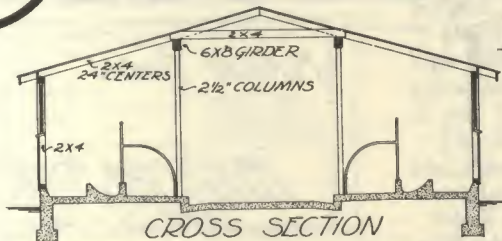
LIST OF MATERIALS

163 SACKS CEMENT
 20 CU. YDS. SAND
 30 CU. YDS. GRAVEL
 6 PIPE COLUMNS 2 1/2" X 10'
 24 - 2X4 - 12'
 24 - 2X4 - 14'
 10 - 2X4 - 16'
 8 - 2X4 - 18'
 84 LIN. FT. 6XB
 46 - 2X4 - 18'
 21 - 2X4 - 12'
 1350' 1X8 DB M SIDING
 1800' SHIP LAP SHEATHING
 16 SQ. 3PLY ROOFING
 12 WINDOW FRAMES
 12 SASH 9LT. 9X12
 150' 1X4 CORNERS & CASG.



FLOOR-PLAN

DESIGN NO. 5042



CROSS SECTION

ARCHITECTURAL DEPARTMENT
 LOUDEN MACHINERY CO.
 FAIRFIELD - IOWA.

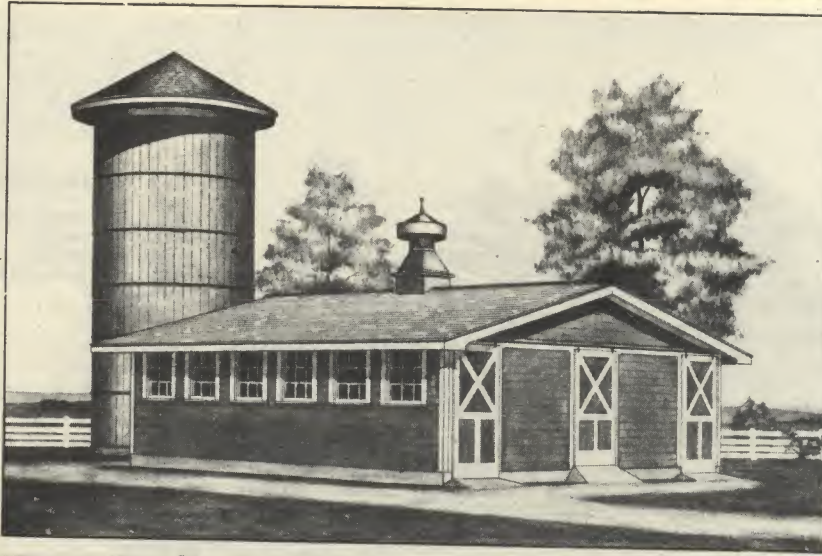
Design 5042

If you are starting with a few cows, and expect to increase your herd from year to year, adopt this design. It has been pronounced the most economical barn construction.

If desired the barn may be left unfinished inside, temporarily, and when the profits from the herd justify the expense it may be boarded, ceiled, or plastered.

The capacity of the barn may be increased at any time by simply building on any additional length required to meet the growth of the herd.

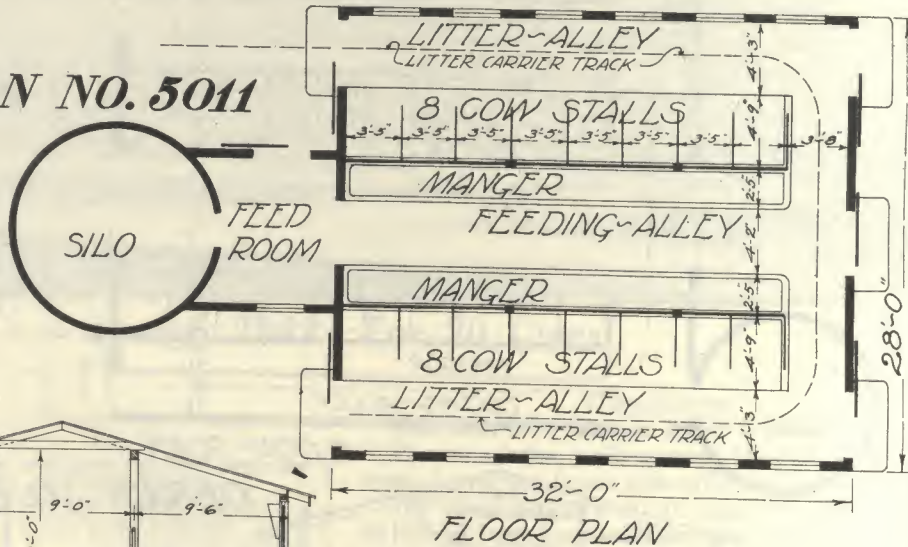
Complete working plans and specifications, \$5.00 per set.



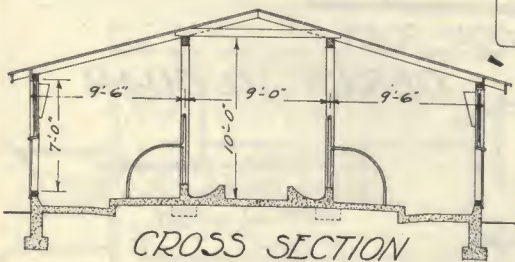
EXTERIOR VIEW

BILL OF MATERIALS
 4 POSTS 6X6"-10'
 16 PLATES 2X4-16
 16 " 2X4-14
 8 " 2X4-10
 19 STUDDING 2X4-14
 10 " 2X4-16
 8 " 2X4-12
 6 BEAMS 6X8-12
 38 RAFTERS 2X4-16
 15 CEILING JOIST 2X4-10
 3 WIND. SILL 2X6-12
 1200 FT. DROP SIDING
 1500 FT. ROOF SHEATHING
 12 SQ. 3 PLY ROOFING
 130 FT. 1X6 FLG. FOR DOORS
 150 FT. 1X4 TRIM
 144 LIN. FT. SASH STOP
 12 SASH 9 LT. 9X12
 158 SACKS CEMENT
 18 CU. YDS. SAND
 34 CU. YDS. GRAVEL

DESIGN NO. 5011



FLOOR PLAN



CROSS SECTION

ARCHITECTURAL DEPARTMENT
 LOUDEN MACHINERY CO.
 FAIRFIELD - IOWA

Design 5011

This barn, though inexpensive, is so designed that every stick of timber and every foot of space will render maximum service.

The construction is extremely simple, but is carefully planned to give the proper amount of air space and window surface for each cow, to provide the most convenient arrangement for feeding and barn cleaning, and to meet the various other conditions that enter into the building of a modern barn.

The plan shown is for 16 cows. It is a very simple matter to add to the length of the barn as your herd grows.

Complete working plans and specifications, \$5.00 per set.



Design 2564—For 12 Cows 2 Pens and Loose Stock

Description

This barn is 30 ft. wide by 60 ft. long.

The foundation wall extends 18 inches above the ground, and the frame sidewalls are 14 ft. high.

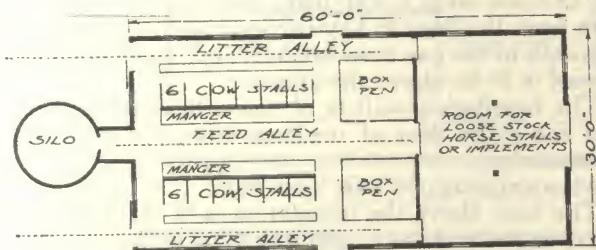
The lower story is 9 ft. high, the hay mow is 21 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 5 ft. high, and the ridge of roof is 34 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 53 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

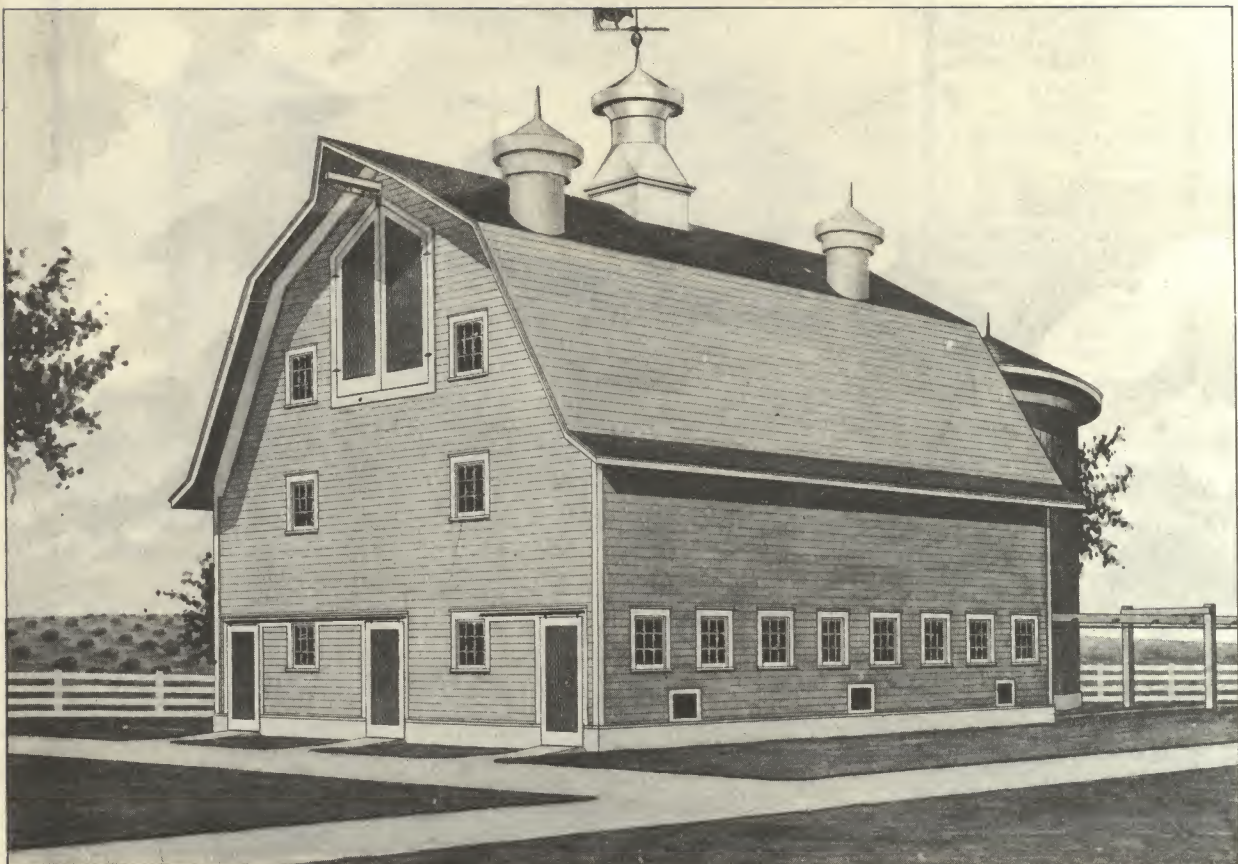
Estimated cost furnished upon application.



Average Periods of Incubation

Chickens.....	20-22 days	Guinea fowls.....	28 days
Geese.....	28-34 days	Pheasants.....	25 days
Ducks.....	28 days	Ostriches.....	40-42 days
Turkeys.....	27-29 days	Pigeons.....	18 days
Canary birds.....	14 days		

**Price of Complete working
 plans and specifications
 for Design 2564 \$5.00**



Design 2558—For 12 Cows and Box Pens

Description

This barn is 40 ft. wide by 50 ft. long.

The foundation wall extends 18 inches above the ground, and the frame sidewalls are 16 ft. high.

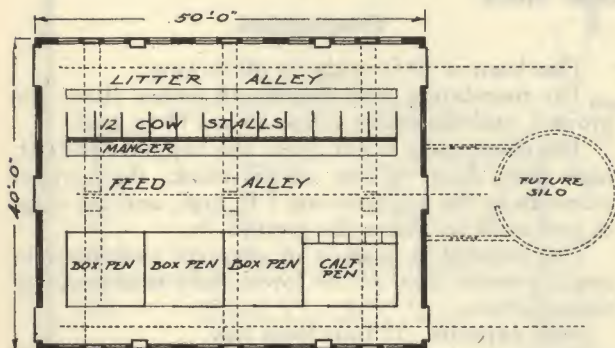
The lower story is 9 ft. high, the hay mow is 26 ft. high from the floor to hay carrier-track, the vertical sidewalls in the hay mow are 8 ft. high, and the ridge of roof is 39 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 64 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.



Louden Machinery Company,

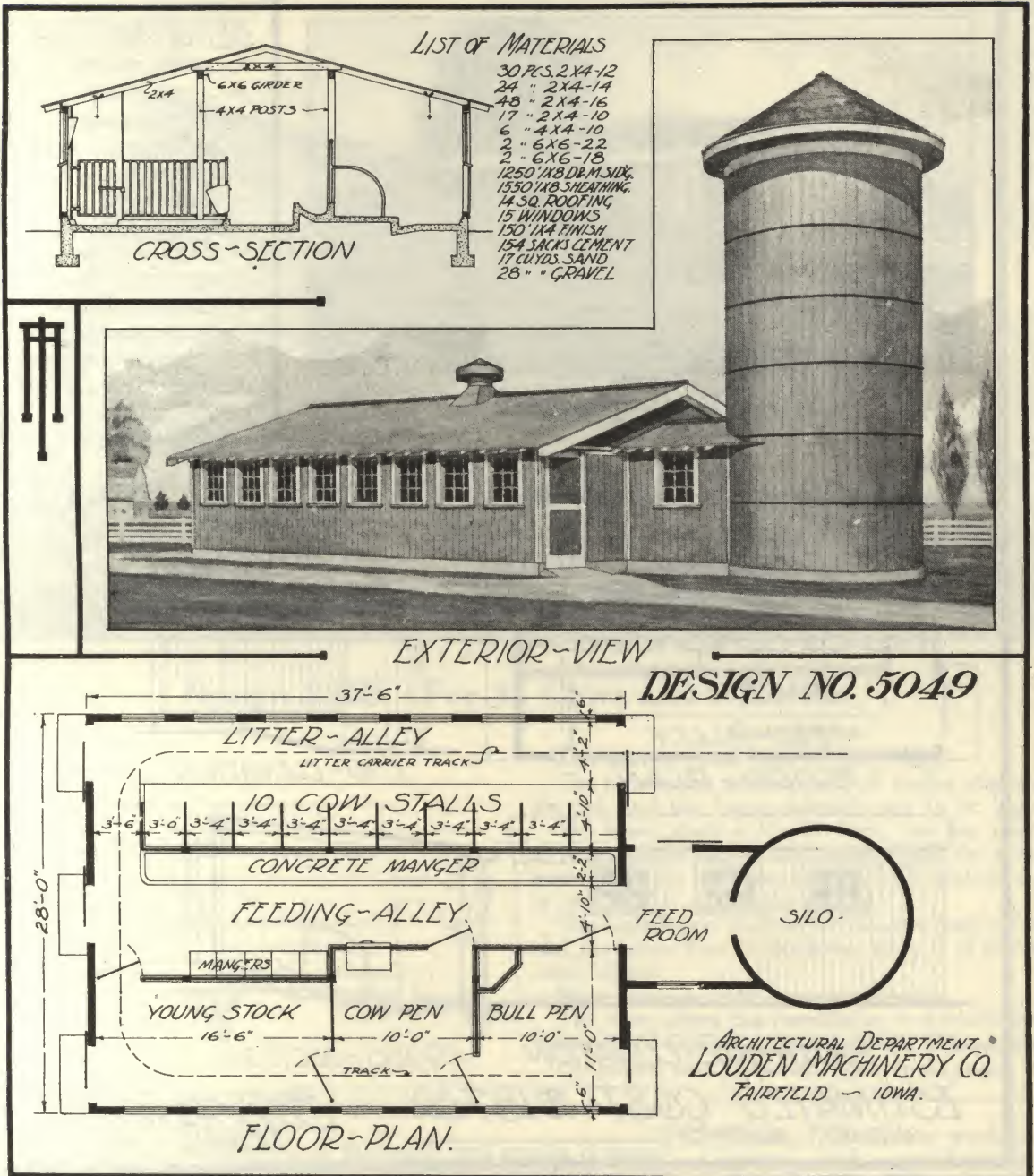
Gentlemen: I want to write you and tell you how much I like the Litter Carrier, and Stalls and Stanchions that you placed in my barn last year.

They are without doubt the greatest labor savers of their kind that I know of. The Carrier is the great thing to induce good work and a clean barn. Instead of a drudgery it is a pleasure to clean the barn, and the track that we have takes the manure away from the barn door and makes it cleaner for the cows and attendants to get in and out. It has the old wheelbarrow "Skinned a Block," and we could not get along without it. The carrier saves all of the manure, as we have placed the cement floor in the barn following the plans that your agent gave me free. We find it a good thing, and do not know how we got along so long without either of these improvements. That calf stall certainly is the finest thing of its kind going.

Yours truly, Fred. W. Green, Decatur, Mich.

**Price of Complete working
 plans and specifications
 for Design 2558 \$5.00**

If your neighbor is going to build tell him about this book—and do both him and us a good turn.

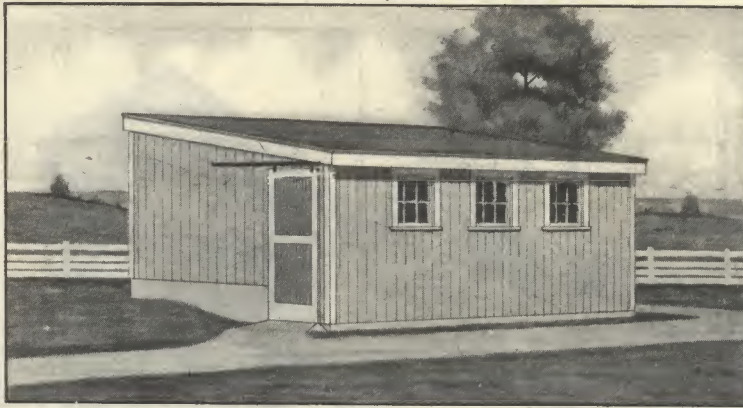


Design 5049

Compare this barn design, for 20 cows, with design 5029, page 72, of the same capacity, but with hay storage overhead. The estimated cost of above barn is about one-half that of the other. In other words, with the two-story type of barn one-half the cost is for sheltering 24 tons of hay, which could be stored in a shed at one end of the one-story barn at a considerable lower figure.

This statement is not intended to discourage the building of the two-story barns. The barn illustrated in design 5029 is a beautiful building and has many points in its favor. Where economy is an important factor, the one-story barn meets every requirement without sacrificing any of the features essential to comfort, cleanliness, and efficiency.

Complete working plans and specifications, \$5.00 per set.

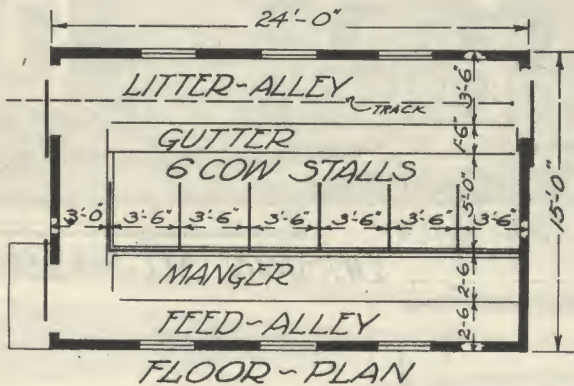


EXTERIOR - VIEW

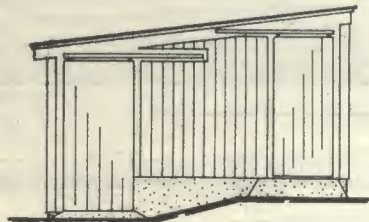
BILL OF MATERIAL

70 SACKS CEMENT
8 CU. YDS. SAND
14 CU. YDS. GRAVEL
12 ANCHOR BOLTS 5/8"x18"
2 SILLS 2X4-16'
4 SILLS 2X4-12'
6 PLATES 2X4-16'
4 GIRTS 2X4-16'
10 RAFTERS 2X6-16'
18 STUDDING 2X4-16'
700 FT. 1X8" MATCHED SIDING
480 FT. SHIPLAP SHEATHING
5 SQ. FELT 3PLY ROOFING
6 SASH GLT. 10"x12"
6 WINDOW FRAMES

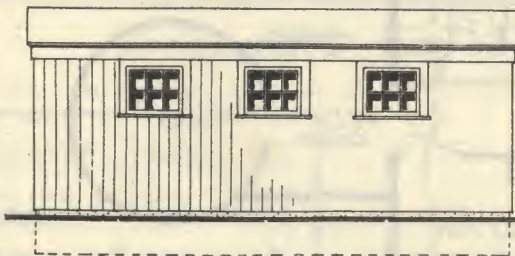
DESIGN NO. 4842



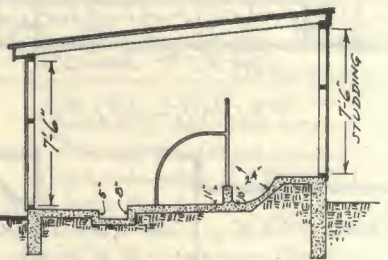
FLOOR - PLAN



END - ELEVATION



SOUTH - SIDE - ELEVATION



CROSS - SECTION

ESTIMATED COST \$187.80
WITHOUT EQUIPMENT

ARCHITECTURAL DEPARTMENT
LOUDEN MACHINERY CO
FAIRFIELD - IOWA.

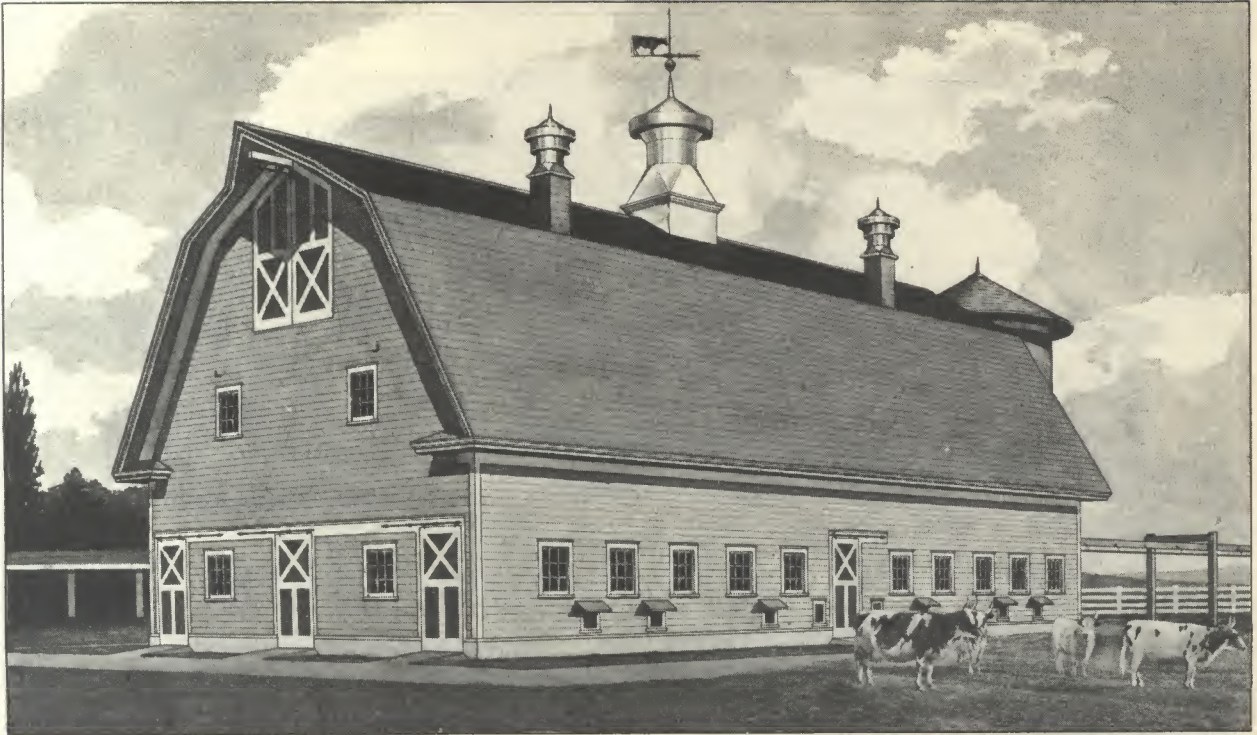
Design 4842

To get good results from your cows they must be kept comfortable and healthy. They need not be housed in an expensive building, but they must have plenty of sunlight and fresh air, and the utmost comfort it is possible to provide.

Design 4842 may be made any length, or may be added to.

This shed, when equipped with sanitary steel stalls, and with concrete floor, gutter, and manger, is just as convenient, healthful, and practical as a more pretentious building. The right kind of a start is the race half won.

Complete working plans and specifications, \$4.00 per set.



Design 2559—For 36 Cows and 6 Horses

Description

This barn is 36 ft. wide by 86 ft. long.

The foundation wall extends 18 inches above the ground, and the frame sidewalls are 16 ft. high.

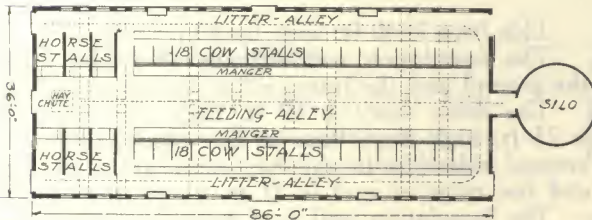
The lower story is 9½ ft. high, the hay mow is 23 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 6 ft. high, and the ridge of roof is 37 ft. above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 110 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.



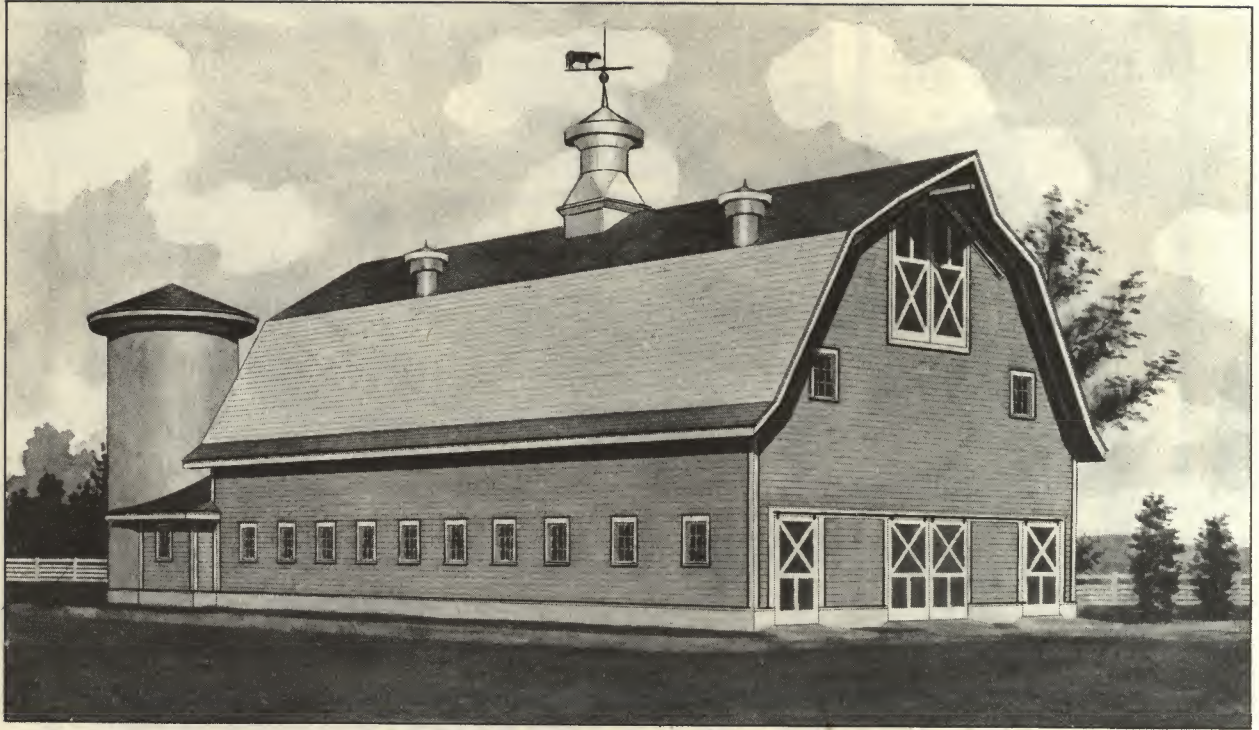
In a warm stable we can coax a baby beef to weigh a thousand pounds before it is a year old.

A farm with poor buildings is at the mercy and caprice of speculators. Grain must be threshed and marketed, regardless of the season.

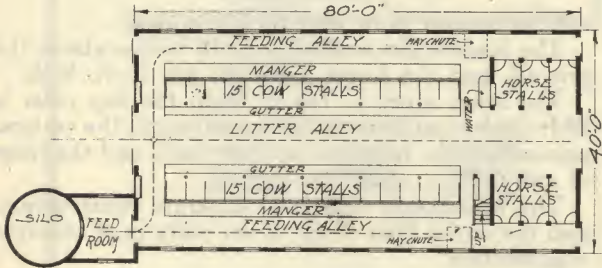
Before the time of good farm buildings, grain sold for little money and a great deal of it was wasted between the field and the cash returns. Increase in the value of live stock has changed the whole farming business. When corn is cheap, instead of feeding it into a heating stove, farmers feed it to cattle and hogs. A good live-stock farm is a busy place. It furnishes something of interest every hour of the day. The live-stock population on a well-managed farm increases each year. The increase demands greater accommodation, so that we must repair the old buildings and we must build new ones.

This is just the same as manufacturing in other lines; no man can remain stationary, and prosper. Factories of all kinds must throw out good machinery that is little the worse for wear, because new processes have been invented and the manufacturer is obliged to keep up with the times. The farmer is no exception.

**Price of Complete working
 plans and specifications
 for Design 2559 \$5.00**



Design 1943—For 30 Cows and 6 Horses



Description

This barn is 40 ft. wide by 80 ft. long.

The foundation wall extends 18 inches above the ground and the frame sidewalls are 14 ft. high.

The lower story is 10 ft. high, the hay mow is 23 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 4 ft. high and the ridge of roof is 37 ft. above the ground.

The foundation wall is of concrete construction and the entire floor of the lower story is of concrete construction.

- Mow capacity, 96 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

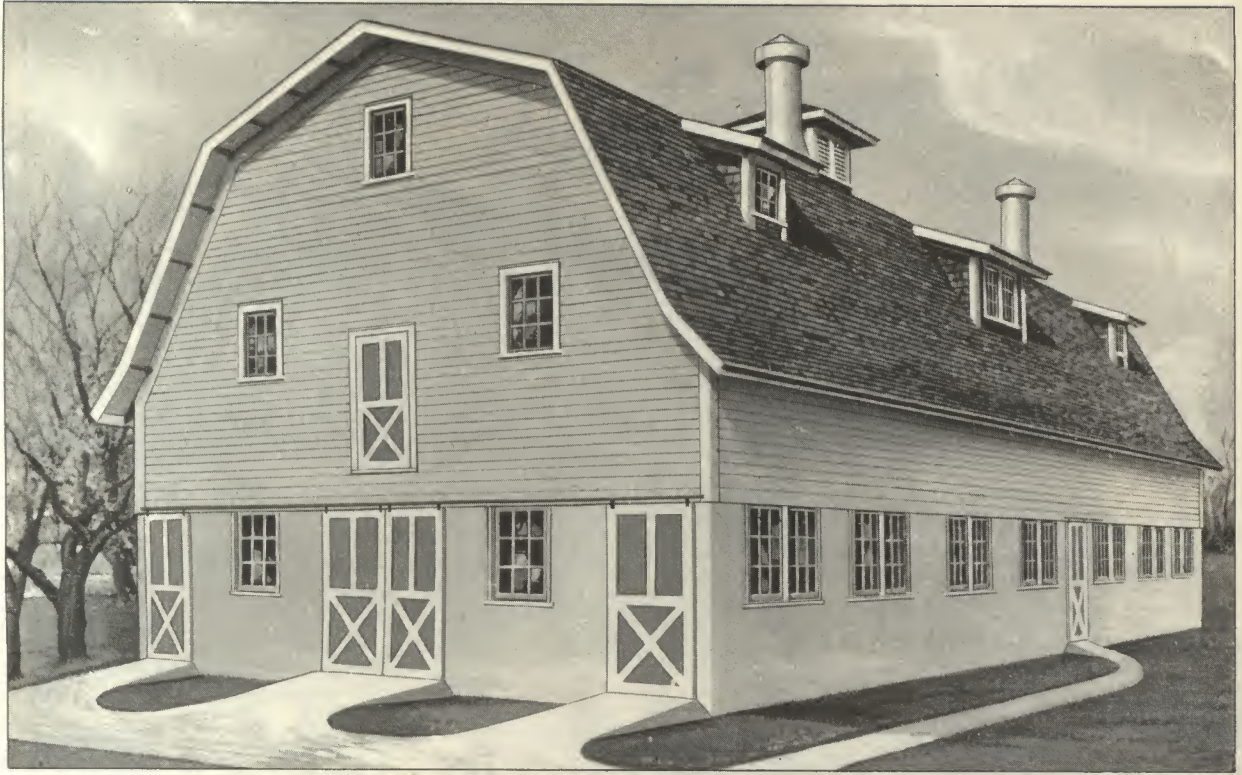
Estimated cost furnished upon application.

Price of Complete working plans and specifications for Design 1943 \$5.00

It would be rather difficult for me to tell you exactly when I first purchased Loudon goods. It has been many years.

The latest considerable bill of goods from you have been in use since 1910 and like all others which I have in use, bought from you at various times, are giving good satisfaction. Will be in the market again soon: and to me modern barn fixtures are synonymous with Loudon.

W. M. Black,
 Makwell, Iowa



Exterior View of Barn Planned for Mr. C. C. Sedgwich, Sioux City, Iowa

Description

This barn is 36 ft. wide by 86 ft. long.

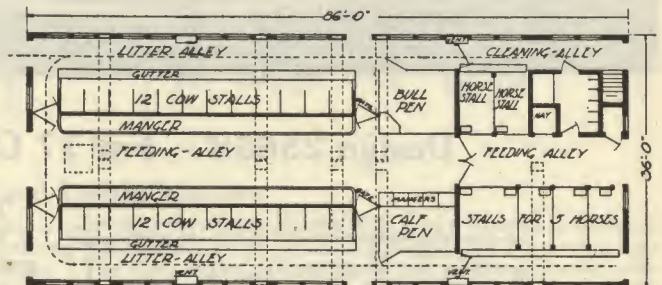
The basement wall extends $9\frac{1}{2}$ ft. above the ground, and the frame sidewalls are 7 ft. high.

The lower story is 9 ft. high, the hay mow is 20 ft. high from floor to hay carrier-track. The ridge of roof is 33 ft. above the ground.

The basement wall is of concrete construction, and the entire floor of the lower story is of concrete construction. Roof is covered with shingles.

Mow capacity, 90 tons loose hay.

The barn above the basement is of plank-frame construction and has a clear hay mow without posts.



Design 4368

For 24 Cows and 7 Horses
2 PENS

Louden Machinery Company,
 Gentlemen:

The Hay Fork I purchased of you is a dandy; used it in clover chaff; handled it fine.

J. H. Maurer, Marshall, Ill.

Price of Complete working plans and specifications for Design 4368. \$10.00



Design 2566B — For 17 Cows and 10 Horses

Description

This barn is 36 ft. wide by 70 ft. long.

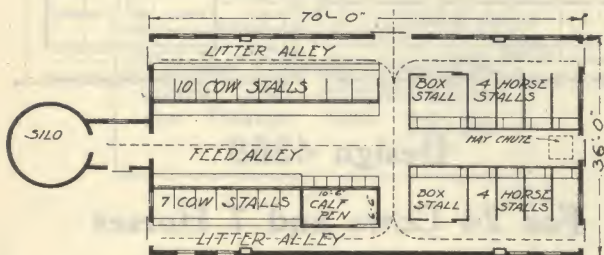
The basement wall extends 10 ft. above the ground and the frame sidewalls are 14 ft. high.

The lower story is 9½ ft. high, the hay mow is 29 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 13 ft. high, and the ridge of roof is 43 ft. above the ground.

The basement wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 100 tons loose hay.

The barn above the basement is of plank-frame construction and has a clear hay mow without posts. Estimated cost furnished upon application.



Painesville, Ohio, July 22, 1913.

Louden Machinery Company,
 Gentlemen:

The carriers are O. K. Have saved their cost already.

Yours truly,

L. M. Johnson, Mgr.,
 "Old Orchard" Farm, Jersey Cattle.

Price of Complete working
 plans and specifications
 for Design 2566B **\$5.00**



Design 2026—For 16 Cows and 18 Horses

Description

This barn is 66 feet wide by 88 feet long. The foundation wall extends 18 inches above the ground, and the frame side walls are 14 feet high.

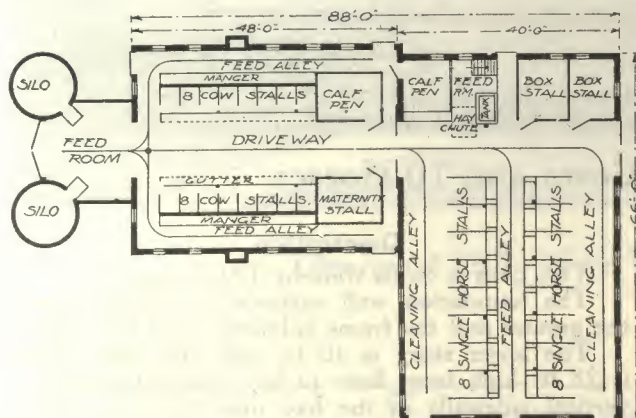
The lower story is 10 feet high, the hay mow is 22 feet high from floor to hay carrier-track, the vertical side walls in the hay mow are 4 feet high, and the ridge of roof is 36 feet above the ground.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

Mow capacity, 80 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost upon application.



**Price of Complete Working
 plans and specifications
 for Design 2026 \$6.00**

Value of Solid and Liquid Manure

Liquid manure is by far the more valuable. It contains largely those fertilizing constituents which have been digested and are soluble. Solid manure or excreta has in it those fertilizing constituents which failed of digestion and absorption into the animal system. They are therefore, mainly in insoluble form. The composition of both liquid and solid manure depends largely upon the kind of food and nature of drink. The following table gives an analysis of liquid and solid manure of different animals after all water has been extracted:

Composition of Dry Matter of Solid and Liquid Manure

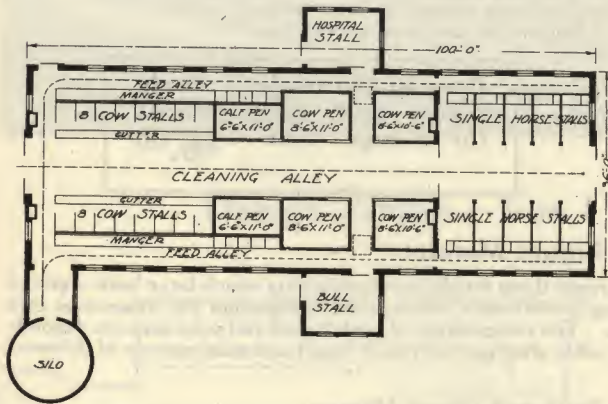
	Nitrogen		Phosphoric Acid		Alkalies (potash and soda)	
	Solid	Liquid	Solid	Liquid	Solid	Liquid
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Horses	2.08	10.9	1.45	Trace	1.25	13.0
Cows	1.87	10.0	1.56	Trace	.62	17.6
Hogs	3.00	12.0	2.25	5.00	2.50	8.5
Sheep	1.78	10.4	1.42	.37	.71	14.9

It will be noticed by a glance at the foregoing table that liquid manure is practically free from phosphoric acid, except in the case of hogs. Further, the reader will notice that it is rich in nitrogen, potash, and soda.

Let us send you "Some Interesting Facts on a Homely Subject." It's a beautifully illustrated book dealing entirely with the fertility of the soil—containing valuable information that every farmer should have. It's free for the asking.



Design 1984—For 16 Cows and 10 Horses



Covering Capacity of Shingles

Average size of shingles—4 x 16 inches—is taken as a basis of calculation.

100 sq. ft. will require, laid 4 inches to the weather 900

100 sq. ft. will require, laid 4½ inches to the weather.....800

100 sq. ft. will require, laid 5 inches to the weather 720

Three and one-half pounds of four-penny nails are required for laying 1,000 shingles.

5 to 10 per cent should be added to these figures for waste and shortage.

Description

This barn is 36 ft. wide by 100 ft. long.

The foundation wall extends 18 inches above the ground and the frame sidewalls are 14 ft. high.

The lower story is 10 ft. high, the hay mow is 22 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 4 ft. high and the ridge of roof is 36 ft. above the ground.

Mow capacity, 100 tons loose hay.

The foundation wall is of concrete construction and the entire floor of the lower story is of concrete construction.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.

Price of Complete working
 plans and specifications
 for Design 1984 **\$5.00**

Dear Sirs;

I made my first purchase of Loudon goods six years ago. I am very much pleased with them. Have never seen anything their equal.

Yours respectfully,

C. B. Eastman, Belleville, N. Y.



Design 1757—For 16 Cows and 7 Horses

Description

This barn is 34 ft. wide by 72 ft. long.

The foundation wall extends 18 inches above the ground and the frame sidewalls are 14 ft. high.

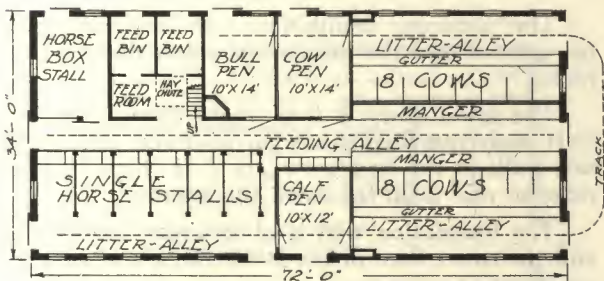
The lower story is 10 ft. high, the hay mow is 20 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 4 ft. high and the ridge of roof is 34 ft. above the ground.

The foundation wall is of concrete construction and the entire floor of the lower story is of concrete construction.

Mow capacity, 60 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.



This makes a very compact barn and each foot of space is put to good use.

The location of the feeding room is convenient to the horses and the cows can be fed from a silo located at one end of the barn if desired.

The hay chute is built inside of the feed room and enclosed to keep the dust out of the stable.

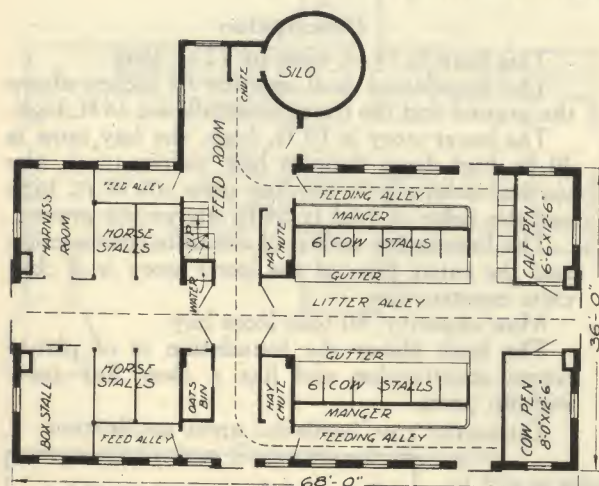
The bins can be filled from the outside and if desired, can be extended up into the second story.

The exterior view shows the end at left hand end of the plan and illustrates how the litter carrier can be run on a suspended track so the manure spreader can be placed under this track and the carrier dumped direct into spreader.

**Price of Complete working
 plans and specifications
 for Design 1757 \$5.00**



Design 8136—For 12 Cows and 4 Horses



Description

This barn is 36 ft. wide by 68 ft. long.

The concrete foundation wall extends up to the ground and the hollow tile side walls are 16 ft. high.

The lower story is 8 ft. high, the hay mow is 25 ft. high from floor to hay carrier-track, the vertical side walls in the hay mow are 7 ft. high and the ridge of roof is 36 ft. above the ground.

The foundation wall is of concrete construction and the entire floor of the lower story is of concrete construction.

Mow capacity, 84 tons loose hay.

The barn roof is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.

This barn has been especially designed for hollow tile wall construction and for a roof covered with asphalt shingles.

It is very fire resisting from the exterior, durable and the hollow masonry walls give it good protection against extreme cold and hot weather.

Price of Complete working
 plans and specifications
 for Design 8136 **\$5.00**



Design 1788—For 12 Cows and 2 Horses

Description

This barn is 34 ft. wide by 44 ft. long.

The foundation wall extends 18 inches above the ground and the frame sidewalls are 14 ft. high.

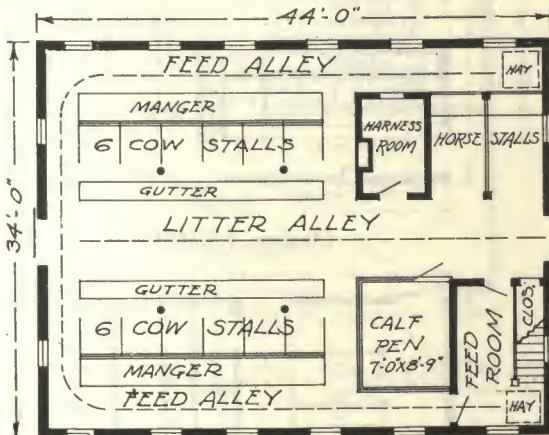
The lower story is 9 ft. high, the hay mow is 21 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 6 ft. high and the ridge of roof is 33 ft. above the ground.

The foundation wall is of concrete construction and the entire floor of the lower story is of concrete construction.

Mow capacity, 40 tons loose hay.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost furnished upon application.

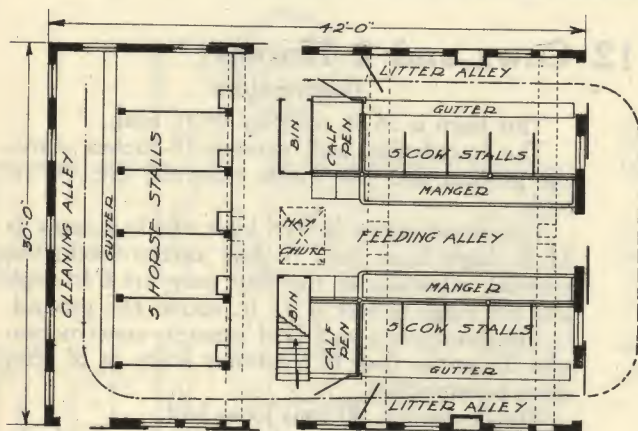


Modern dairy barns equipped with modern labor saving and sanitary appliances is the foundation of economy, and produces the kind of milk that brings the best prices.

Price of Complete working
 plans and specifications
 for Design 1788 **\$5.00**



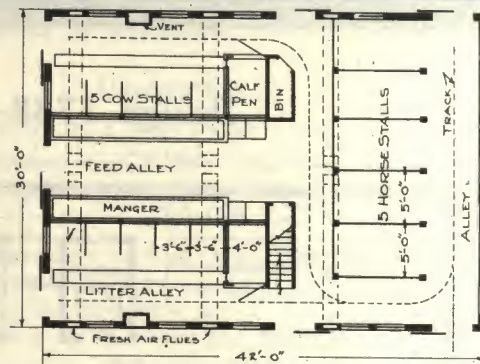
Design 1508—For 10 Cows and 5 Horses



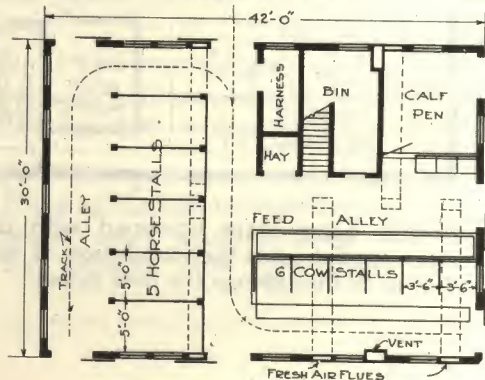
Design 1508A

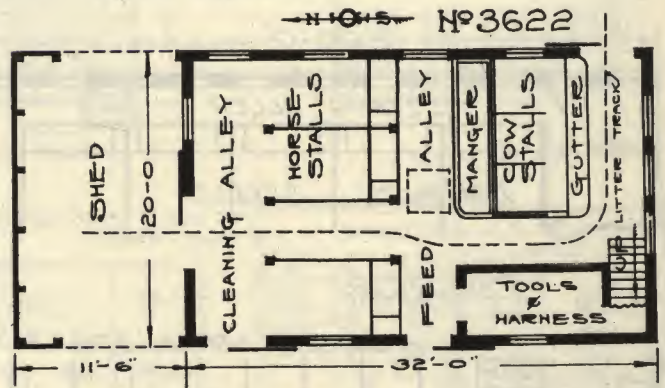
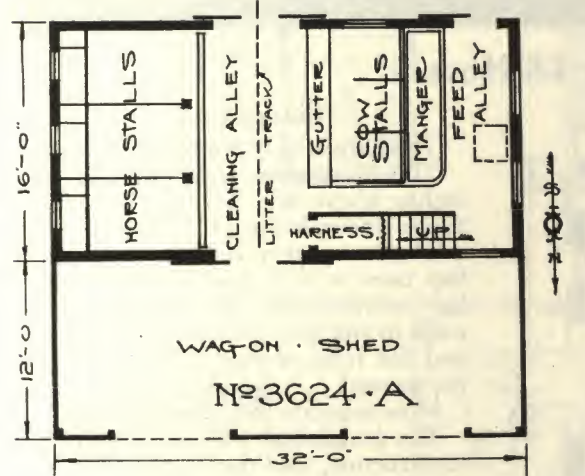
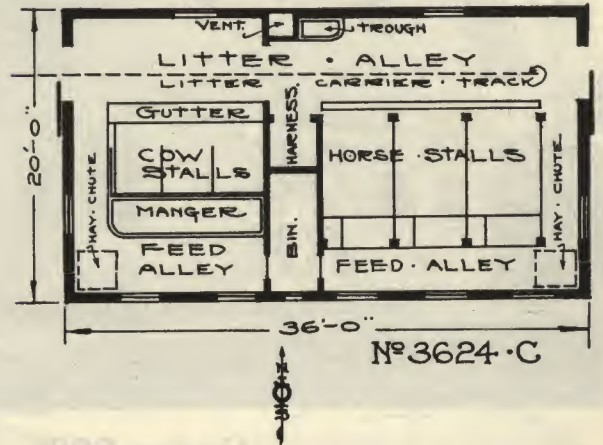
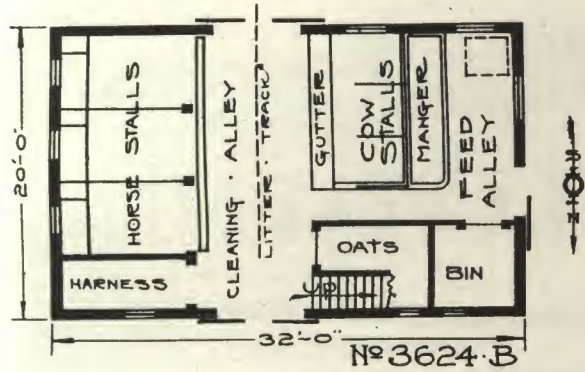
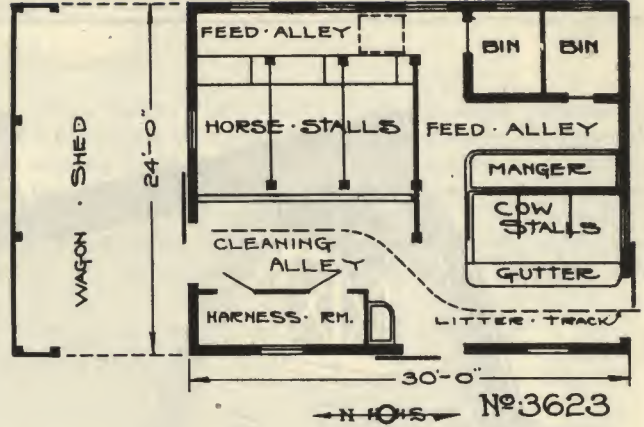
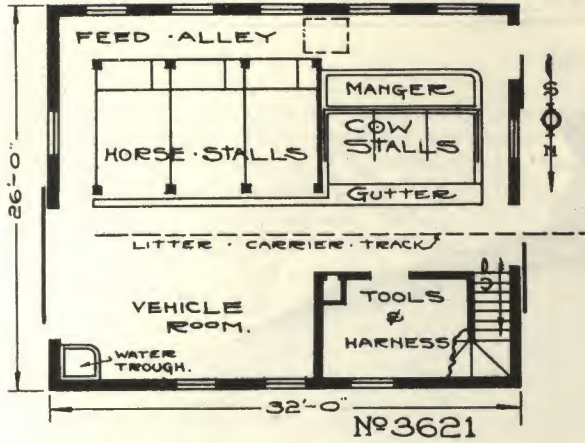
Three floor plans are offered for this barn which is 30 by 42 feet of plank frame construction and has a concrete foundation wall extending 18 inches above the ground. The mow has a capacity of 40 tons of loose hay. 1508B is similar to 1508A only that the plan of arrangement is reversed.

Price of complete working plans and specifications for either of the three arrangements shown \$5.00.



Design 1508B



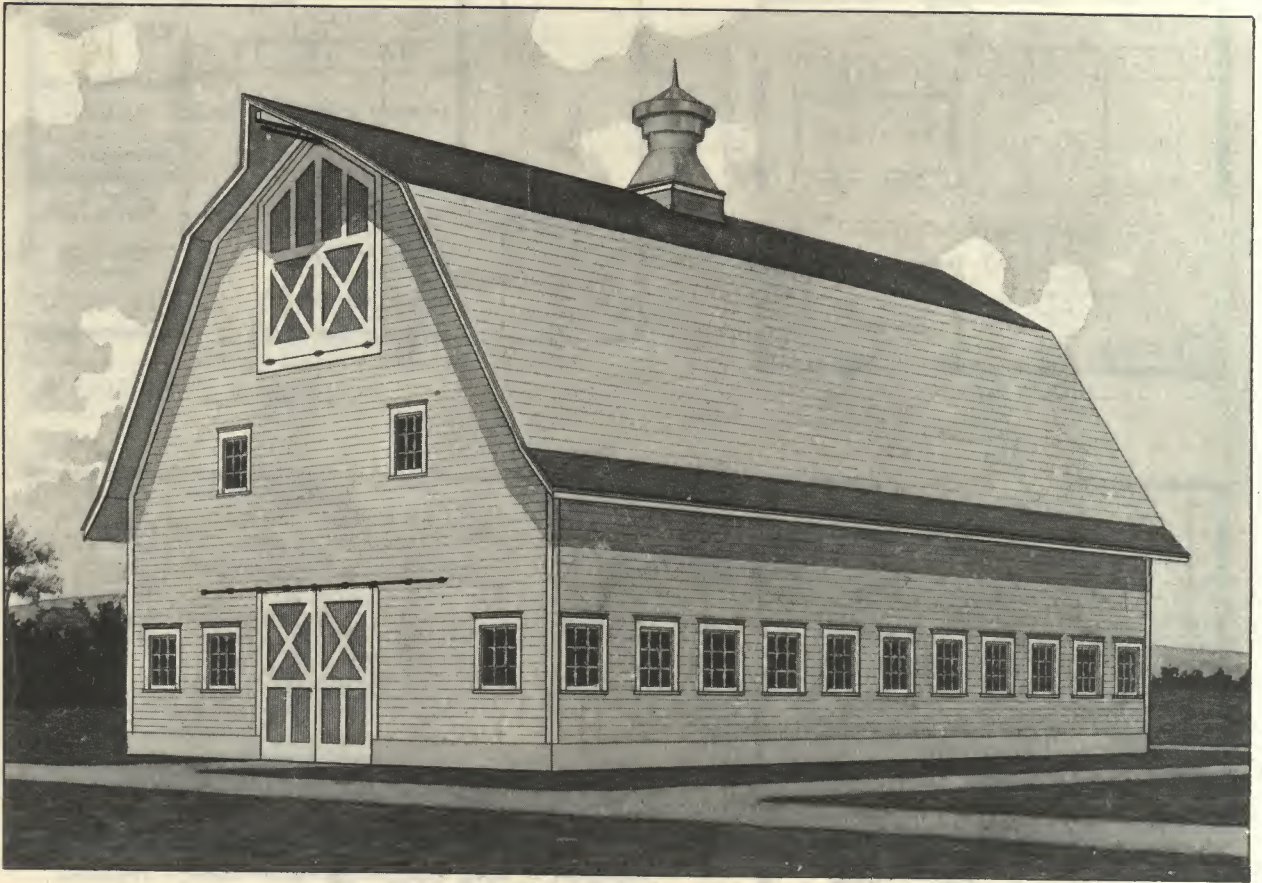


GROUP OF BARNES FOR 3 HORSES & 3 COWS

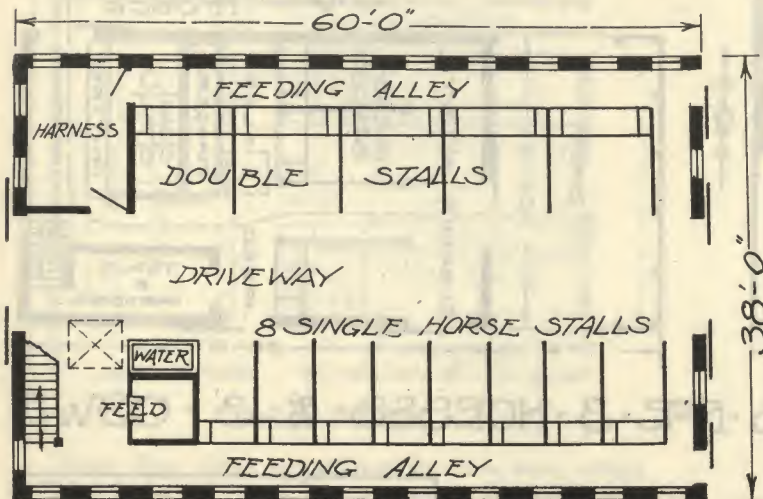
If you are interested in one of these plans write us for particulars of the one you like and we will be pleased to give a full explanation of the same. These barns are all very practical for the man with a small place and are inexpensive to build.

Price of Complete working plans and specifications

Each **\$500**



Design 2065—For 18 Horses



Description

This barn is 38 ft. wide by 60 ft. long. The foundation wall extends 18 inches above the ground, and the frame sidewalls are 14 ft. high.

The lower story is 10 ft. high, the hay mow is 24 ft. high from floor to hay carrier-track, the vertical sidewalls in the hay mow are 4 ft. high, and the ridge of roof is 38 ft. above the ground.

Mow capacity, 80 tons loose hay.

The foundation wall is of concrete construction, and the entire floor of the lower story is of concrete construction.

The barn above the foundation is of plank-frame construction and has a clear hay mow without posts.

Estimated cost upon application.

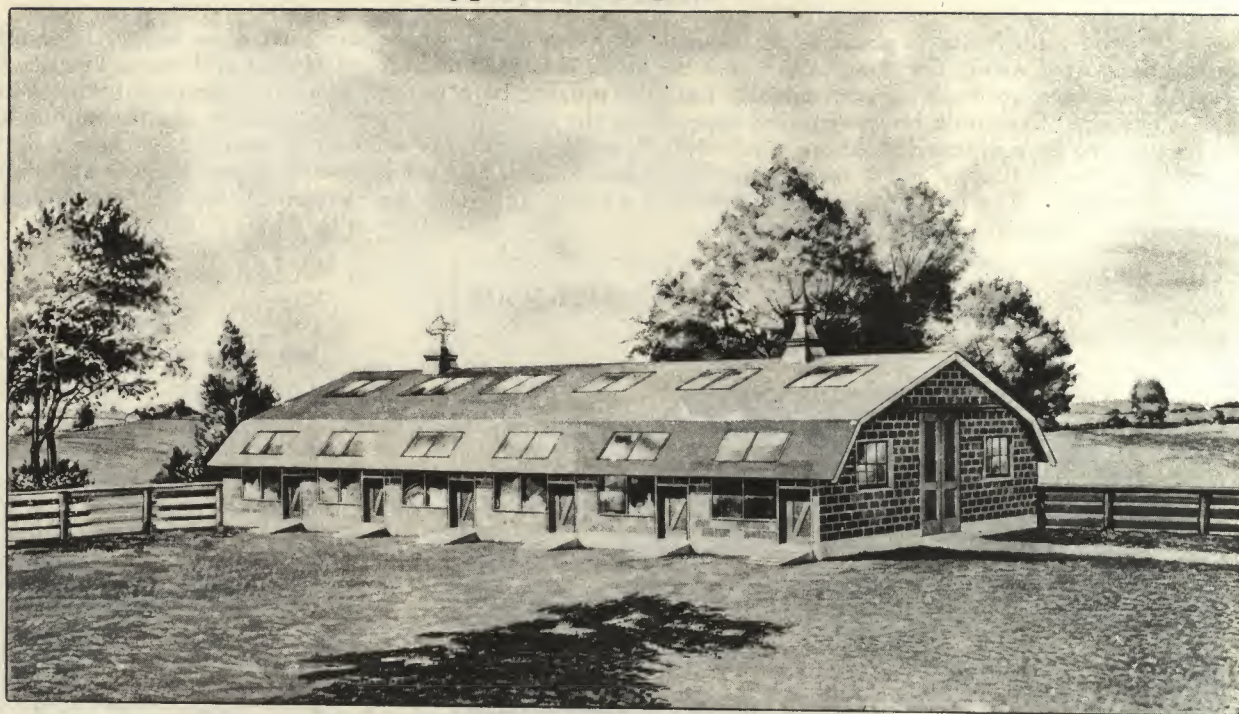
Gentlemen:

Am pleased to say that the Loudon Stalls and Feed and Litter Carriers purchased from you for our new barn have proved satisfactory. We are pleased with them in every particular.

Yours very truly, John Michels,
 Milwaukee County School of Agriculture and Domestic Economy,
 Wauwatosa, Wis.

**Price of Complete working
 plans and specifications
 for Design 2065 \$5.00**

Types of Hog Houses



The Louden Sunshine Type X Hog House

This type of hog house is the design we recommend over all other types. Such a recommendation is based entirely on merit alone and not on account of any personal fancy. However, the east-west location of the building is almost as important as the design itself if the best results are to be obtained.

Because of the very great importance of sunshine in the modern hog house, good sunshine was made the main requirement in the design of the Louden Sunshine Type X Hog House. Type X shows a good flood of sunshine in the pens during the critical months of February, March and April, when an adequate amount of sunshine on the floors of the farrowing pens is of vital importance. In the Type X House the greatest volume of sunshine is obtained without excessive window area. At the same time such features of construction as head room, are far better in this type of house than in others.

The Louden Sunshine Type X Hog House so thoroughly embodies *all* of the good features which the ideal community hog house should have, that it is entitled to the preference over any of the other types.

Sunshine. All windows in the Type X house, located east and west, admit sunshine into the house constantly throughout the day—an efficiency not possible in a house located north and south. In addition, from 9 in the morning until 3 in the afternoon, March 1, latitude 42°, this warm sunshine is concentrated not only to the greatest degree upon the floors of the pens, but also upon *the nests within the pens*, the place where the sunshine is needed most. Latitude 42° is the boundary line between California and Oregon, runs through central Iowa, touches Chicago and follows along the northern edge of Pennsylvania.

Heat Loss. This design of building is easy to heat, owing to its low ceiling (10 feet) and the minimum amount of glass window surface, which is all placed on the warm sides of the building, away from the cold north, wintery blasts that are so prevalent in the hog raising belt.

Head Room. The first pitch of the hip roof in the Type X House makes it possible to obtain good head room for the workman in the back part of each row of pens. In many types, good head room along the walls has to be sacrificed in order to keep the ceiling low enough to avoid excessive heat loss.

Cost. The Type X Hog House is an economical house to build and is less expensive than the Half Monitor Type C House.

Open Ceiling. In the Type X Hog House, with its hip roof construction, there are no cumbersome cross braces inside the building to obstruct the sunshine that enters the windows.

Appearance. The hip roof construction of the Type X House is pleasing and attractive. It makes a good looking building.

Types of Hog Houses



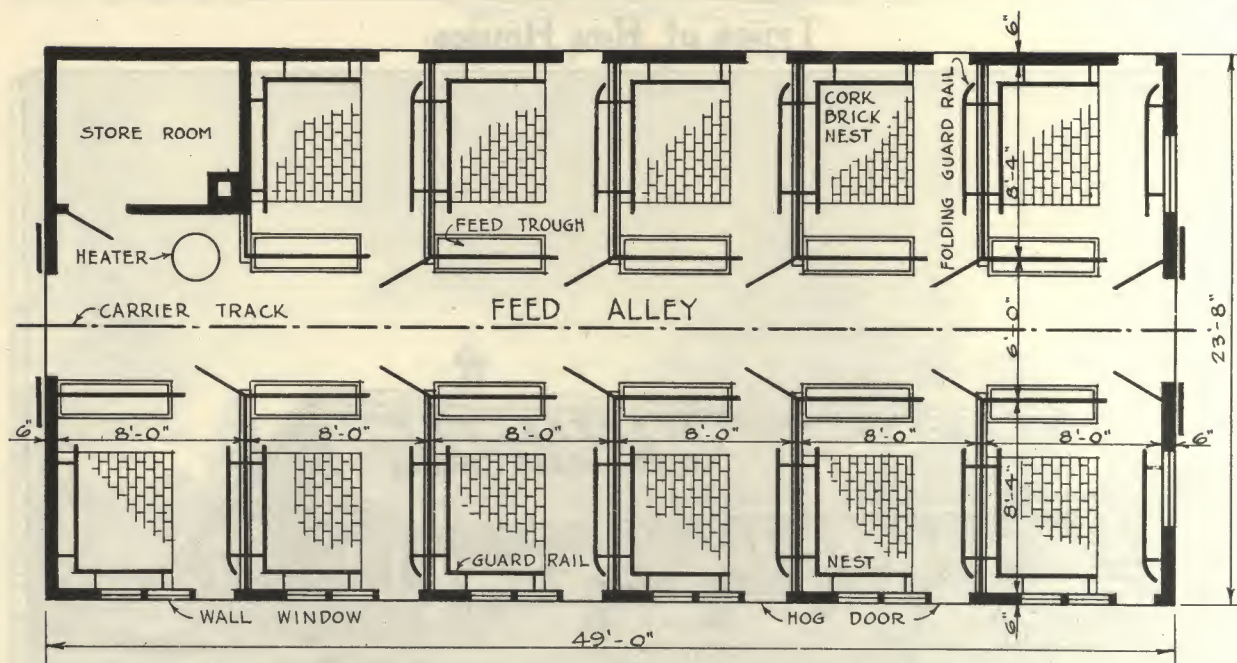
The Half Monitor Type C Hog House

This type, commonly known as the Saw-Tooth or Half Monitor, is a one-story house running east and west, with windows on the south front only. The usual interior arrangement is a row of pens on each side with an alleyway in the middle. The pens along the north wall receive sunshine from the upper windows, while those along the south wall are fed by the lower windows.

The Half Monitor was one of the first distinctive types of the community hog house to come into general favor, and today it is probably more commonly used than all other types combined. To some extent this general use was due rather to the fact that the hog raiser had very little choice to select from, than from the extreme all-around efficiency of this particular design. However, the Half Monitor house does have certain points of merit that are recognized. On the other hand, it embodies some objectionable features that are a disadvantage.

Its Good Features. The windows of this Half Monitor Type C Hog House are very efficient in flooding the beds of each pen with sunshine during the entire day, from 9 o'clock in the morning until 3 o'clock in the afternoon, March 1, on latitude 42°—during the critically important farrowing season. However, to get the best results, the total glass area per pen section (the width of one pen across the building) must be around 36 square feet, as compared with a glass area of 30 square feet in the Louden Sunshine Type X Hog House. Thirty-six square feet is a little high from the standpoint of heat loss. The location of the windows will vary somewhat with the latitude in which the hog house is built, in order to get the greatest amount of sunshine where it is needed most. This is, however, a very simple matter and is information which we give freely upon request.

The Disadvantages. While the sunshine in the house is good—too much waste space has to be enclosed in building the Half Monitor type so the windows are right to receive it. However, the most serious objection to this design is the extremely high ceiling which makes the house more difficult to heat. Another inconvenient feature is the lack of head room at the back of the pens along the north wall. After summing up the good and bad features of this type we believe the Louden Sunshine Type X Hog House shown on page 98 is to be preferred over this Half Monitor House. It concentrates more sunshine in the nests of both rows of pens; has less glass area and a lower ceiling which makes it easier to heat; affords more head room along the walls; is neater in appearance and is a cheaper house to build.



Floor Plan of the Louden Hog House

A good interior arrangement of the east-west Louden Hog House is shown above. Capacity of this particular plan, 12 pens, or, eleven pens and a storage room.

The arrangement embodying a row of pens on each side of the building with a feed alley in the middle is generally accepted as being the most practical and economical arrangement possible. Next to this in importance is the proper location of the nest, or bed, in each individual pen. Our investigation disclosed the fact that in the East-West type of house it is preferable to place the nests next to the wall and on the west side of each pen, for two reasons: (1) In this position they get the best possible sunshine from early morning until late afternoon and are just a little better protected from the doors leading out into the yard. (2) Arranged in this manner the nests are separated from each other so that sows in adjoining pens are not so liable to irritate each other at farrowing time as may occur when nests are placed back to back.

Fig. 1379 shows a detail of the nest. It may be made out of concrete, hollow tile with concrete surface, plank, wood blocks or cork bricks. However, cork bricks are preferable for the following reasons: (1) They absorb practically no moisture. This assures a comparatively dry nest which is very desirable. (2) They are a slow conductor of heat and therefore make a warmer bed than one constructed out of concrete or masonry. (3) They are slightly resilient and for that reason will not tire the feet of a heavy sow so much. (4) The asphaltic compounds used in the manufacture of cork brick are fatal to many forms of bacterial growth. This further adds to their sanitary qualities. (5) They do not expand or contract. (6) Their wearing qualities are good. Thus from every standpoint cork brick is a practical and satisfactory material for use in the floor of a nest.

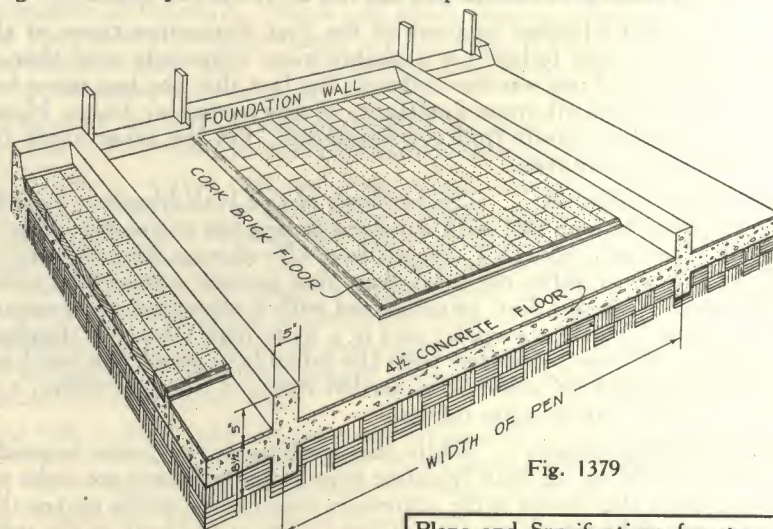
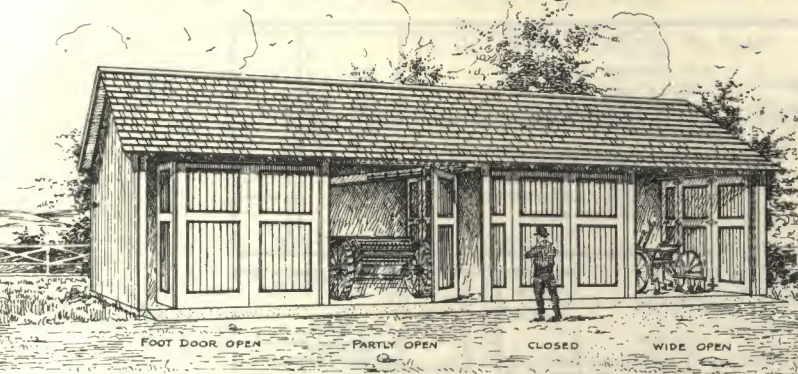


Fig. 1379

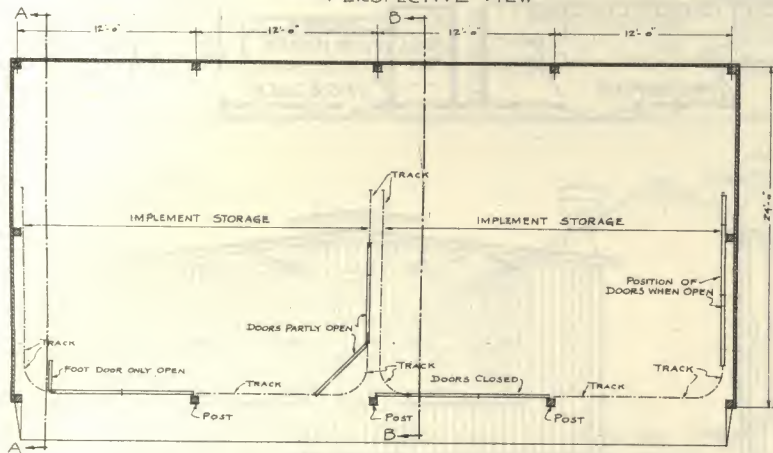
Plans and Specifications for standard Type X or Type C Hog Houses, \$20.00.
 For bill of materials, \$5.00 additional.
 Special plans gladly made. Prices on request.

The hog house, arranged as above, is convenient, sanitary, and saves many steps in doing the necessary daily work.

Implement Shed Design 7748



~ PERSPECTIVE VIEW ~

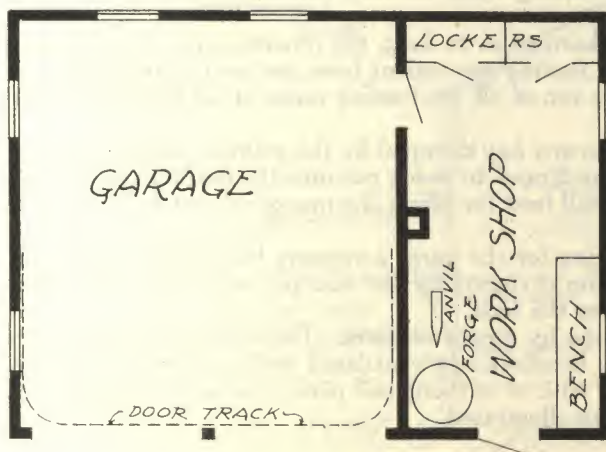


~ FLOOR PLAN ~

A Handy Shop and Garage

No farm is complete without a small shop where simple repairs can be made. The farm garage is likewise indispensable, and combining the two, makes it convenient. The small stove which heats the shop will also keep the auto radiator from freezing in extreme cold weather.

Garage and Shop Design 7886



Save Your Farm Machinery

Saving applies to farm machinery just as truly as it does to food rations, clothing, etc. It is up to every farmer to save his mower, rake, tractor, plow, automobile, binder, and all other farm implements, by housing them during the seasons when they are not in use.

You Will Be Needing An Implement Shed This Year

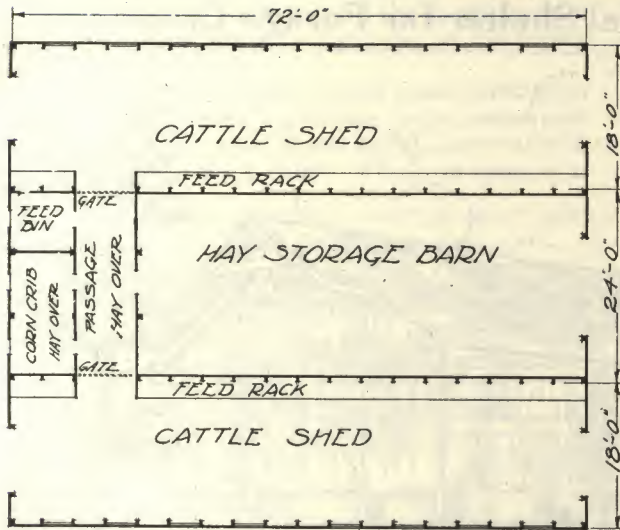
On many farms it will be necessary this year to build implement sheds for the proper care of farm machinery. With this in mind, we show the plan of what we consider an ideal building for this purpose. The expense of construction can be kept down to the minimum, yet it is as roomy and thoroughly convenient as is possible to build such a shed. We can furnish you with blue printed, scaled drawings of the designs shown on this page, to follow for their construction, and when it is finished you will agree that it is the handiest machinery shed you ever saw.

The building shown on this plan has four 12-ft openings. However, the number of openings, as well as the size of each, can be varied to suit your own particular requirements.

How About Doors?

Probably the most convenient feature of this implement shed is the arrangement of the doors. One entire side is made up of doors, and doors can be provided on both sides if desired. The openings are necessarily large, requiring large doors, which are really too heavy for hinges—the weight of the door is apt to bend the hinges or spring them so that the door will not hang plumb. It naturally follows that such doors would not fit up tight and that they would not be weather-proof. Another very objectionable feature to the hinged door is that it has to be propped open and in running a binder or any other large machine into the building, the prop is apt to be dislodged, allowing the door to swing in and catch the machine, probably bending or breaking some of the mechanism.

Turn to page 108 and see the handiest door ever devised for an implement shed or garage.



Description

Foundation consists of concrete piers. Side walls are made of vertical boarding. Prepared roofing used on flat sheds and shingles or corrugated iron can be used on hay barn.

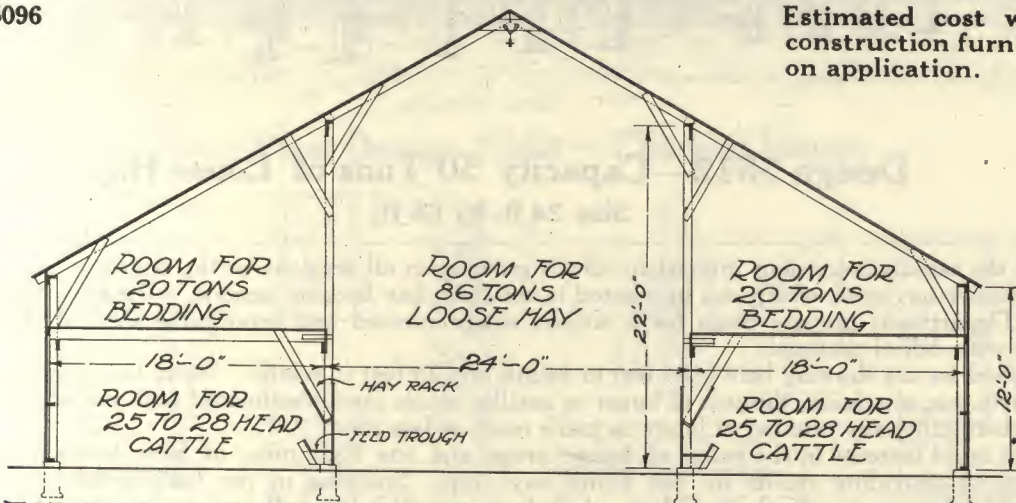
This plan meets the general requirements for feeding cattle and can be economically built out of light timber.

Our working plans explain the construction so thoroughly that any one handy with saw and hammer can build it.

It can be built any length to suit capacity required and can be added to as the herd grows.

Design 5096

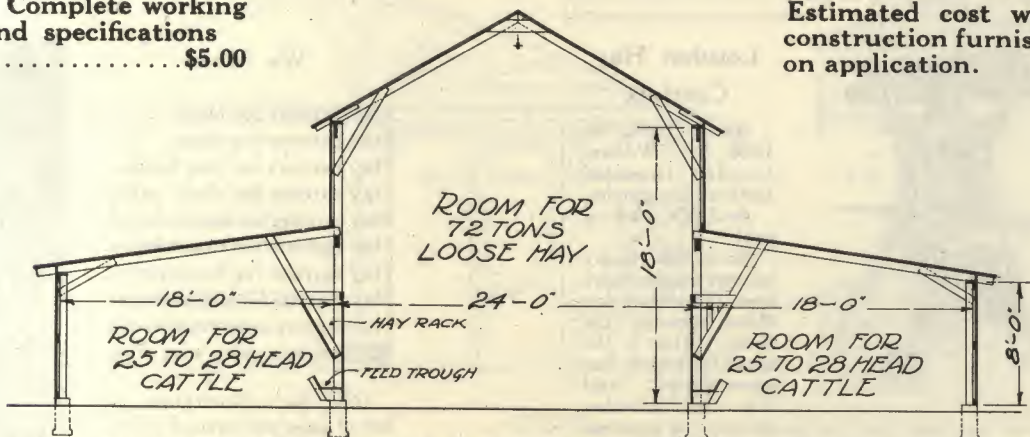
Estimated cost with this construction furnished upon application.



FOR THIS TYPE OF CONSTRUCTION ORDER PLAN 5096A

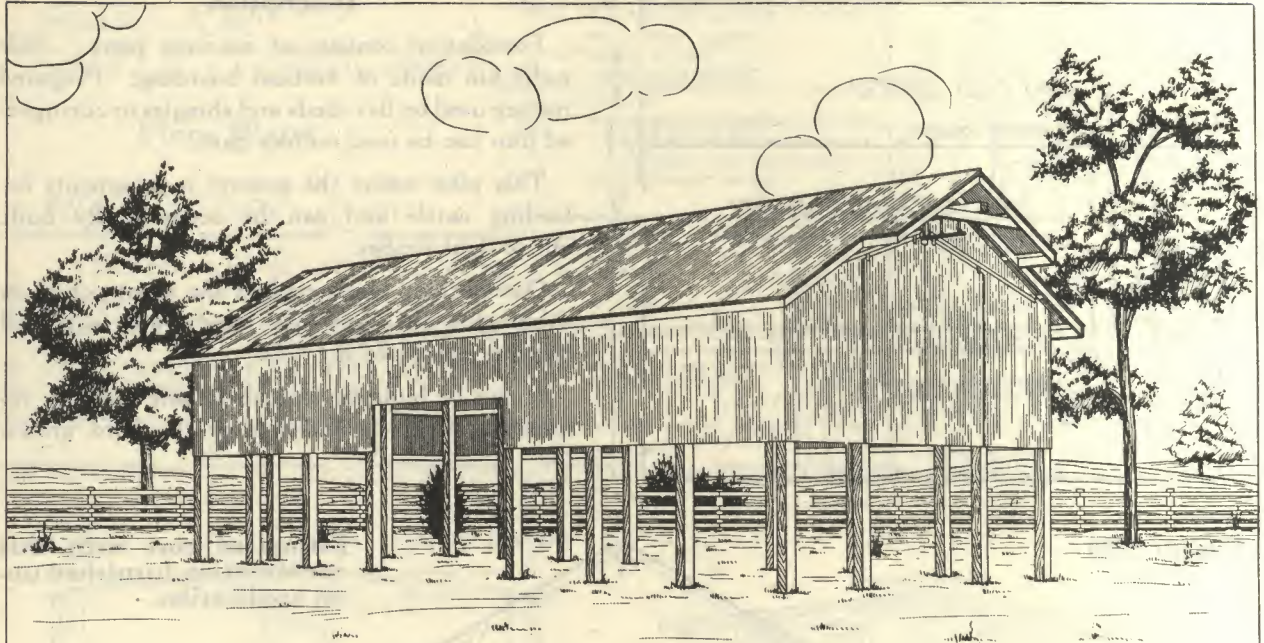
Price of Complete working plans and specifications
\$5.00

Estimated cost with this construction furnished upon application.



FOR THIS TYPE OF CONSTRUCTION ORDER PLAN 5096B

In expensive and Substantial Shelter for Forage Crops

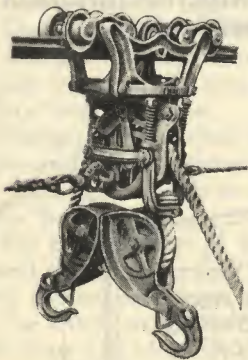


Design 3512—Capacity 50 Tons of Loose Hay
 Size 24 ft. by 64 ft.

With the rapidly increasing interest in alfalfa growing in all sections of the country, the demand for an inexpensive hay shed, which can be erected in the field, has become general. We have had our Architectural Department prepare plans for a simple, easily erected and serviceable shed of this character together with bill of material.

The shed we are showing here is 64 feet in length and 24 feet in width. Using the amount of material in this structure as a basis, the cost of larger or smaller sheds can be estimated with no difficulty, by adding or subtracting any number of bents to make more or less room.

The rapid increase in the value of forage crops and the high price of farm lands emphasize the advantage of providing shelter for the entire hay crop. Stacking in the field without cover means considerably deterioration and actual loss. In a large crop this loss will amount to almost the cost of a shelter in a year or two. Even in the semi-arid and other regions where the rainfall is inconsequent, the necessity for shedding is felt.



Louden Hay Carriers

Away back in 1866 Mr. William Louden invented the first hay carrier.

And it's working yet!

Since 1867 many improvements have been made, but one thing remains the same. That's the quality which has never varied. And it's this Louden

quality that has kept the Louden factory the greatest manufacturer of barn equipment in the world for almost half a century.

We Make

- Hay carriers for forks.
- Hay carriers for slings.
- Hay carriers for long barns.
- Hay carriers for short barns.
- Hay carriers for square barns.
- Hay carriers for round barns.
- Hay carriers for horse power.
- Hay carriers for engine power.
- Hay carriers using manila rope.
- Hay carriers using wire rope.

(NOTE:— Illustration at left of page shows the Louden Carryall Sling Carrier.)

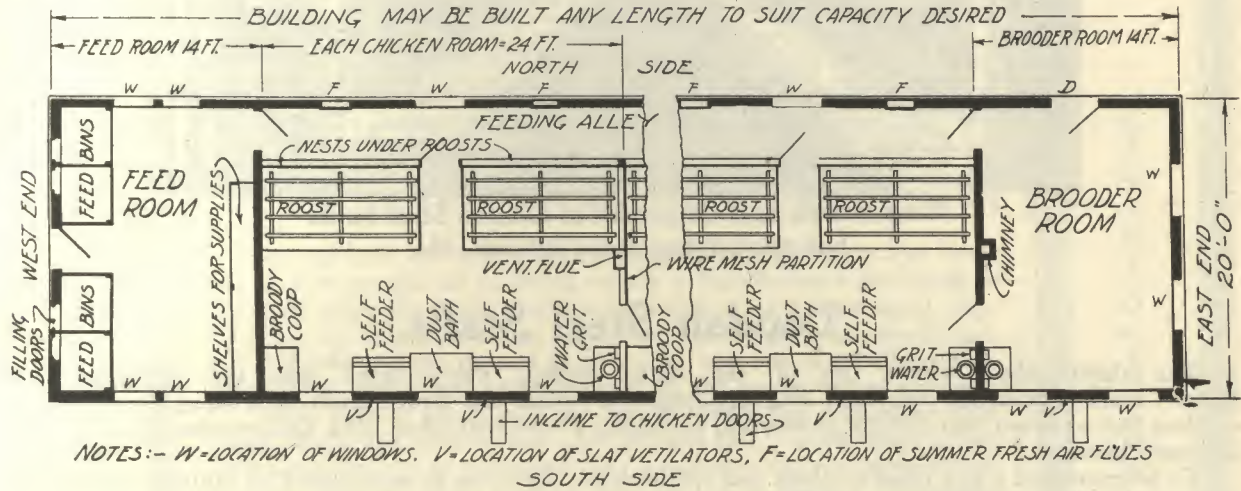


THE POULTRY HOUSE

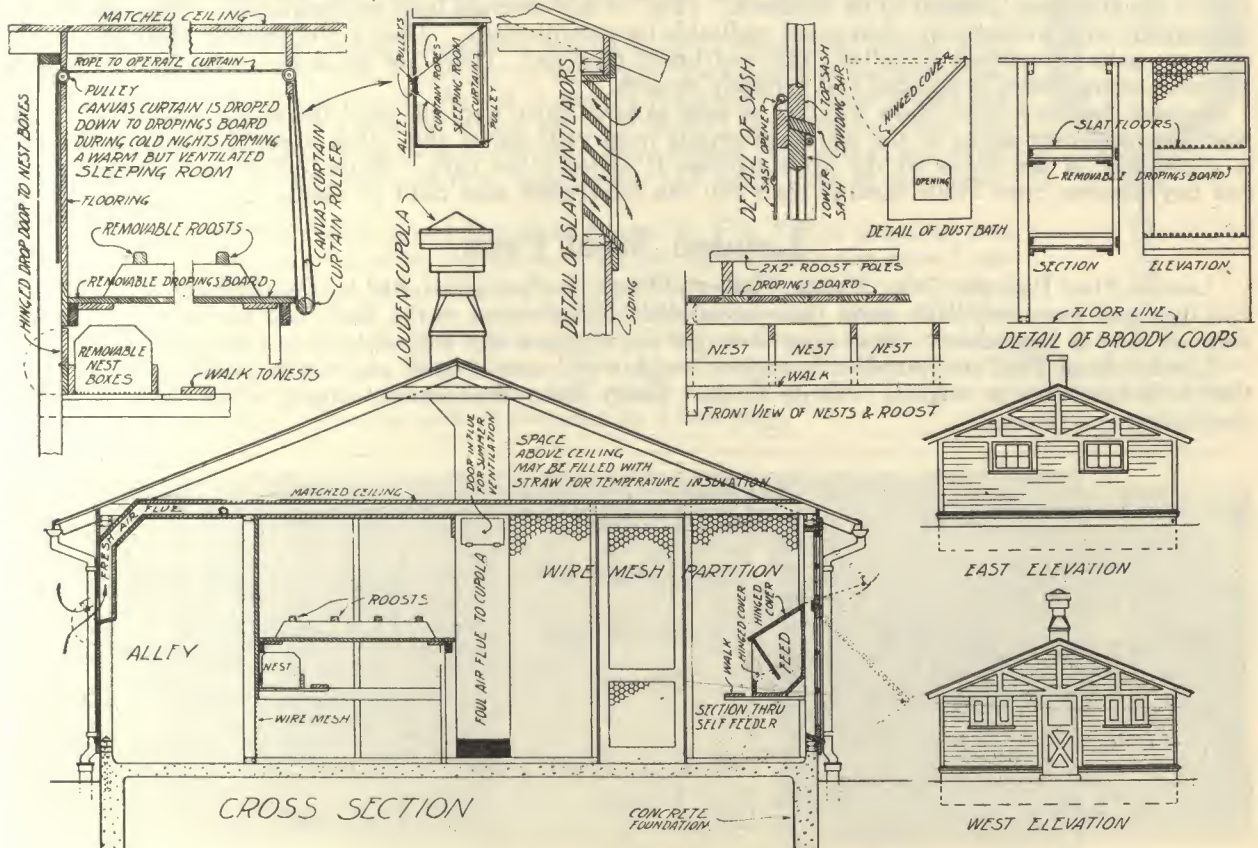
Always face the house toward the south so as to get the sun's rays throughout the day in the winter to keep it bright inside.

A poultry house usually needs more ventilation than is given. Fresh air is far more important than warmth. Fresh air means health, but it should never be supplied by a draft. The best system of

ventilation for the ordinary poultry house is a cloth covered window, which allows the air to pass through slowly. Only in coldest weather, however, is the cloth pulled across the window. For the rest of the time it is left wide open. Where a house has its south side made up largely of a window group only about half of the spaces should be glazed and the other half left open, and cloth screens supplied.



Floor Plan Design 7543—Chicken House





Comfortable and Contented in Louden Steel Stalls
 Longview Farm, Lees Summit, Mo.

Louden Steel Stalls

The above photo shows one of the many famous dairy barns that are equipped with Louden stalls. Scientific dairymen long ago began to realize the direct profit in housing their cows in comfort and we often hear of milk production increasing 25 per cent when cows are transferred to Louden equipped barns.

To be contented a cow must be clean and comfortable; she must be surrounded by sanitary conditions; she must have plenty of light and fresh air.

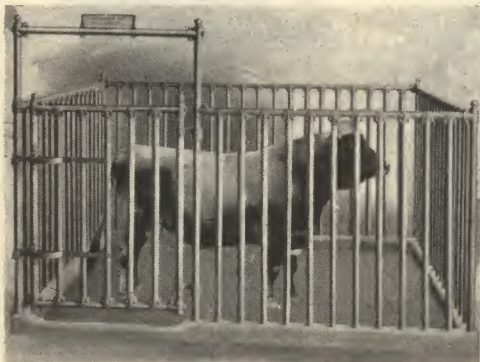
Louden Sanitary Steel Stalls meet every condition. They are constructed of high carbon tubular steel—the strongest material to be obtained. They do not obstruct light or ventilation. They are fitted throughout with overlapping, dust-proof malleable iron connections. They are absolutely sanitary; there are no cracks or crevices to collect filth and breed bacteria. There are no sharp projections to injure the cow; every corner is rounded and perfectly smooth.

Louden Sanitary Steel Stalls will last as long as your barn, and will earn the amount of the original cost over and over again in the increased profits from your cows; and, while a profit-maker, each stall is a pleasure to the owner in the attractiveness it adds to the barn. Write to-day for booklets. You can buy Louden Steel Stalls cheaper than you can have good ones built of wood.

Louden Steel Pens

Louden Steel Pens for Cows, Calves, Bulls and Hogs, are being installed by thousands of farmers who find that steel pens cost little more than wood, add attractiveness to the barn, and are more sanitary as they are easy to keep clean. Steel pens never get out of repair and will outlast the average barn.

Louden Steel Pens are furnished in various weights and sizes of steel and can be made to fit any area that it is necessary to enclose. Write for our Dairy Barn Equipment catalog which gives detailed description and prices.



**Louden
 Steel Pens are
 Sanitary and
 Strong**

*Write for Special
 Catalogs*



Louden Tubular Steel and Wood Lined Cow Stanchions

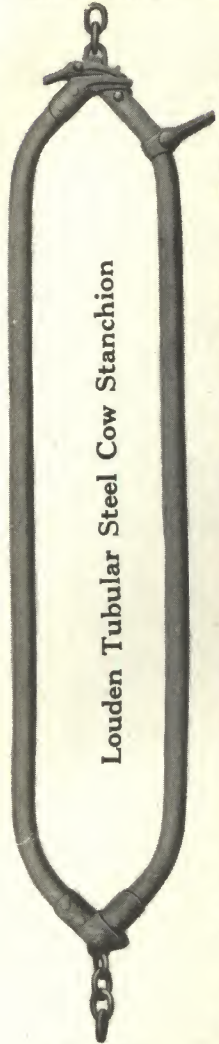


Fig. 861.

The tie or the means to hold the cow in the stall, is of the utmost importance. It comes in the most direct contact with the cow, and it must be right to secure the best results. It must hold her securely so she cannot get out of her place, and at the same time she should not feel in the least degree hampered in her natural movements. In other words, the cow must be securely held in the stall and at the same time she should not feel that she is being held at all.

Many devices have been made to secure this result, but after the most thorough tests it is the general consensus of opinion by the best posted dairymen in the world that there is nothing that equals Louden Tubular Steel Stanchion, which is shown by Figure 861, and Louden Wood-Lined Stanchion shown in Figure 937. They are strong enough to hold the heaviest bull when he tries to get out, but when in his proper place there is not a feather's weight of pressure on him.

The slack in the chains which hold them will permit the lower end of the stanchions to swing nearly a foot forward and back or sidewise, while the upper end is susceptible of an almost equal play. The cow can freely move her head from side to side, can reach back to her flanks and get up and lie down and can rest in a natural position just as easily and unrestrainedly as she would out in the field.

There isn't a rough spot or corner about the stanchions that would injure the neck of the most delicate calf. Every part is perfectly smooth, and is so shaped that it will give the cow the greatest possible freedom while securely holding her in place. The chains will permit the stanchions to freely turn to give the cow all necessary freedom, and yet, not turn so far as to "get wrong side to", as it would if it had a swivel.

The Louden Stanchions can be hung in Wood Stall Frame or in Tubular Steel Frame, or in any other place where a cow stanchion can be used at all. As will be seen by Figure 861, the Steel stanchions consist of two sides, which are $1\frac{5}{8}$ inch O. D. Tubular Steel, and which have their ends inwardly bent toward each other, and fitted with latch irons at their upper ends, and hinge irons at their lower ends.

Our Wood-Lined Stanchion shown by Fig. 937 is decidedly the best of its class on the market. It has substantially the same hinge and latch as our Tubular Steel Stanchion, and a number of its good points, which other wood-lined stanchions do not have. Besides this, it is made of a special shape of high carbon T steel, provided with a small rib as shown in illustration. This rib adds considerably to its strength and prevents the wood strip from getting split or knocked off, which is liable to occur in other wood-lined stanchions. We make only one size—7-inches wide in the clear by 4 feet long.

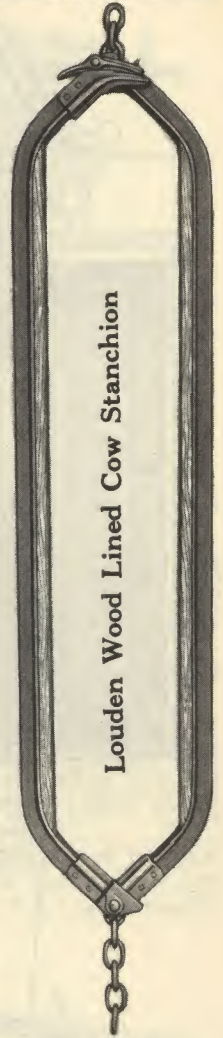


Fig. 937.





Car can stand within a few inches of the door. No waste space with the Louden-hung door.

THE LOUDEN GARAGE DOOR HANGER.

Meets every condition perfectly—convenience, safety, space economy, ease of operation, permanence, inexpensiveness, and beauty of design.

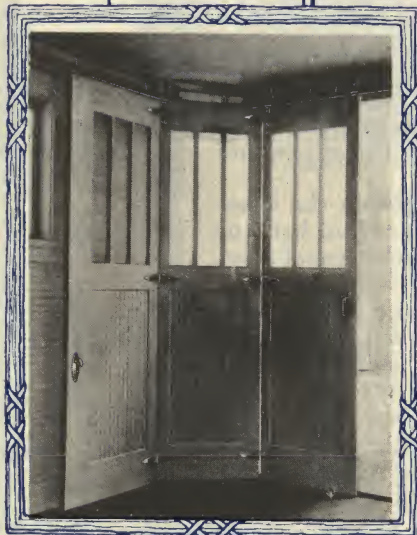
The door is built in three parts, hinged together, so it can slide around a short curve. It is hung on swiveled roller-bearing trolleys that operate on a continuous steel track.

The track extends across the door opening, inside, and for an equal distance along the adjoining wall, curved at the corner.

Because of the room it saves, the convenience it affords, and the lasting satisfaction you will derive from it, the Louden-hung Garage Door is an exceptionally profitable investment.



Exterior view of Double Garage in which two Louden Doors are used.



The door slides around the corner smoothly. Ease of operation makes it popular.



When closed, door fits snug and tight. Everything inside out of the weather and free from construction.



Door lies flat against the wall when open—out of the way.

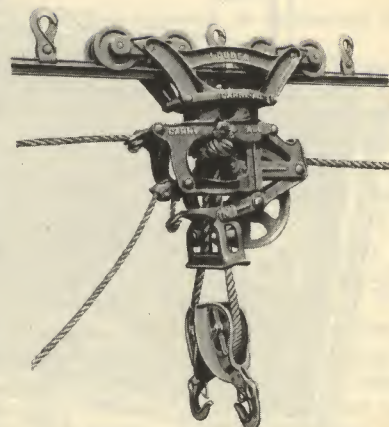


One section swings like an ordinary hinged door, making it unnecessary to build a special door for walking in and out.

Louden Hay Tools



Louden Senior Fork Carrier.



Carry-All Sling Carrier

and positive in their action. Louden quality is known in every part of the globe where hay is harvested by modern methods.

The Louden Fork and Sling Carriers, the Balance Grapple Fork, and the Carryall Sling are unusually dependable and satisfactory hay unloading tools. They are the result of years of study and experiment. They represent the best in material and workmanship; the strongest, most practical, most efficient tools of their kind sold, regardless of make or price.

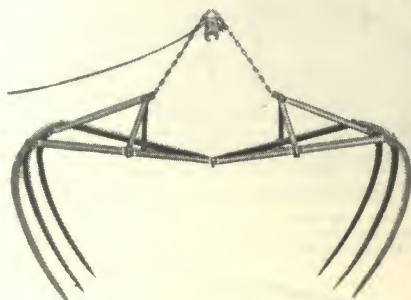
We also manufacture Pulleys, Field Stackers, Power Hoists, etc. The complete line is shown in the Hay Tool catalog. Copy mailed on request.

Louden Fork and Sling Carriers are made for steel, wood or cable track in twenty different styles. There's a carrier to meet every condition which may arise. The parts are few and simple; there is nothing to get out of order. Efficiency is the watchword in the manufacture of Louden Carriers, and to this fact their wide popularity is largely due. The Louden Senior fork and Carryall sling carrier shown in the accompanying illustrations, are two of the leading carriers for American use.

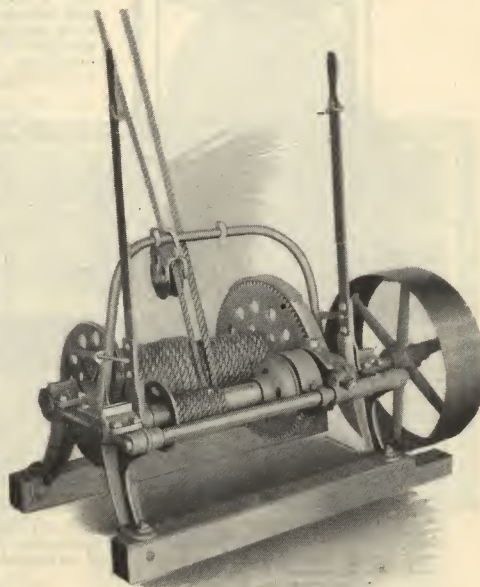
Louden Slings were the first to be put on the market, and continue to be first in quality of material and workmanship. They are made in several styles and may be successfully used for any kind of hay or roughage. For heavy work the Carryall sling is the leader. It has a double lock and is built exceptionally strong throughout. It has four parallel ropes with two additional cross ropes between the spreaders to keep short stuff from shattering through. It is factory tested at 3000 pounds.

The Louden Power Hoist is made in two styles, single and triple drum, and may be used for mowing hay in either a center-drive or an end-drive barn. It may be operated with steam, gasoline or electric power. The power hoist will give you a valuable "lift" in hay time. It saves the labor of one man and one team, and does the work in one-half or one-third the time.

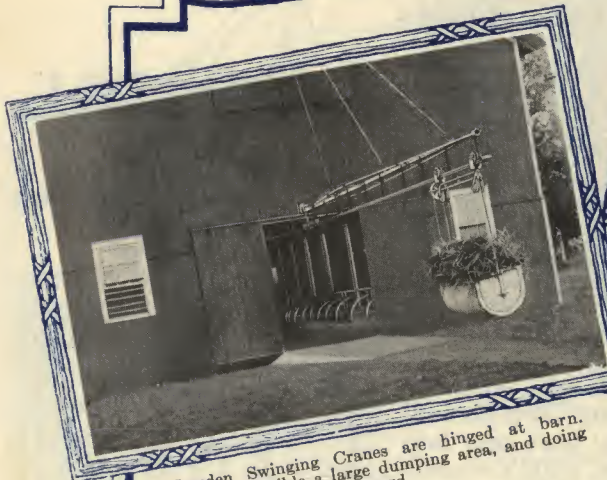
The Louden Power Hoist will not only prove a time and dollar saver during hay time, but will prove a handy help about the farm whenever a "lift" is needed. It is used successfully for elevating wagon boxes, removing hay racks, and in building construction. It is the most reliable hoist ever offered at anywhere near the price, and we can recommend it from every standpoint. Nothing ever offered equals the Louden Power Hoist and Carryall sling for putting hay into the mow or on the stack.



Louden Balance Grapple Fork.



Louden Single Drum Power Hoist.



Louden Swinging Cranes are hinged at barn, making possible a large dumping area, and doing away with posts in the yard.



Track arranged with slight incline so carrier may be emptied with trip rope and returned to barn. A barn in Sweden.

Louden Carriers

Louden Litter Carriers are great time and labor savers. With a Loudon Litter Carrier barn cleaning is made easy and pleasant work. Every farm needs this equipment. Manure may be taken directly from the stalls to the spreader or manure pit with but one handling and in half the time necessary by the old-fashioned method.

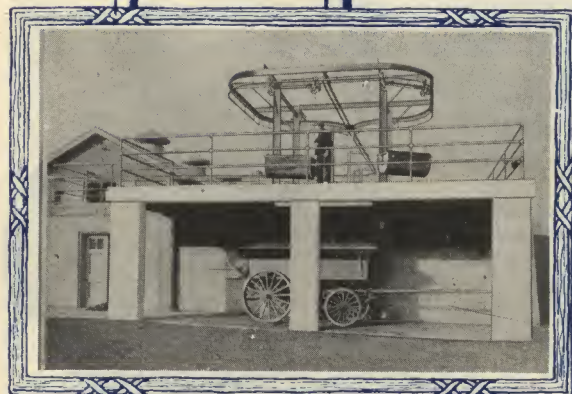
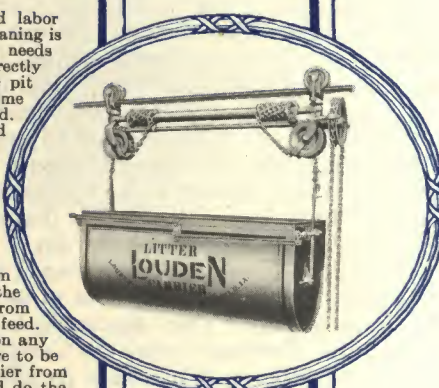
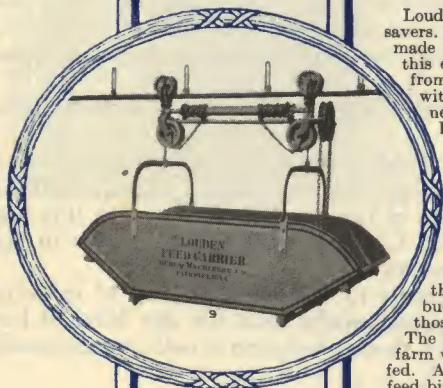
Loaded cars may be raised and lowered to any height by a small boy, and run out and emptied anywhere desired.

Write today for detailed information and catalogs and lessen your winter barn work. Loudon Carriers are made in several different styles both for Steel and Wire

Track.

Louden Feed Carriers are relief from the bucket, the wheelbarrow and the bushel basket, and the waste resulting from those old-fashioned methods of handling feed.

The Loudon Feed Carriers are a necessity on any farm where a dozen or more head of stock are to be fed. A boy of ten years can operate the carrier from feed bin or silo to mangers or feed racks, and do the work with less effort than it takes you to run a loaded wheelbarrow. Write us, giving outline of your feeding conditions, and we will gladly furnish estimates free. Loudon Feed Carriers are made in many styles.



An intricate but successful track arrangement at the Soldiers' Home, Washington, D. C. Loudon track can be furnished on special order for any degree curve.



Louden Feed and Litter Carriers, and Loudon Stalls and Stanchions are used in this modern round barn at the Hershey Farms, Hershey, Pa.

Louden Barn Door Hangers

Louden Barn Door Hangers are unexcelled for use with any door where it is desired to overcome the inconvenience and awkwardness of a clumsy swinging door.

Special Features of Bird Proof Hanger

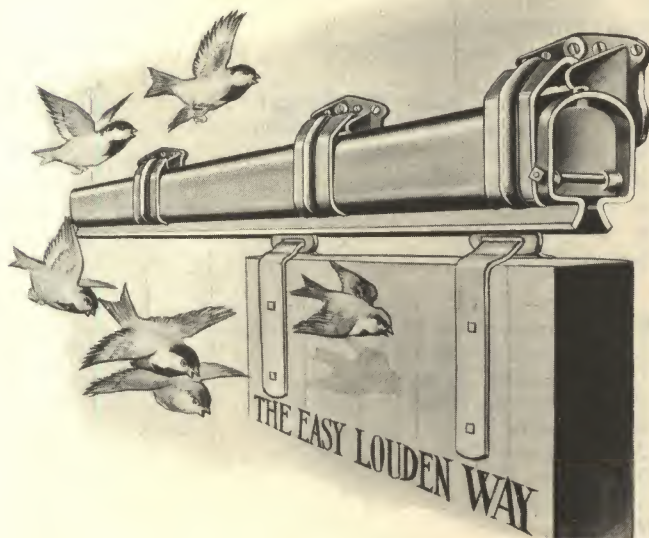
TROLLEYS COMPLETELY ENCLOSED. The only opening is the narrow slit beneath the track.

There is no chance for the trolleys to be clogged or derailed. The track is absolutely proof against nesting birds, trash, rain, snow or sleet.

FLEXIBLE AT TWO POINTS. The joint in the hanger strap allows the door to swing out away from the building, frequently avoiding breakage by crowding stock. The joint in the track support permits the track itself to swing out from the building, making it possible to easily dislodge trash and dirt which may accumulate behind the track and rot out the siding. This double flexibility allows the door to fit snugly without sticking or binding.

ROLLER BEARING TANDEM TROLLEYS. The trolley wheels revolve on hardened steel roller bearings around a tempered steel shaft. Always roll easily. A light push will open or close the heaviest door.

TROLLEYS RUN ON LEVEL TREAD. The Bird Proof track is square, not oval. The level tread reduces friction to the minimum and overcomes the wedging tendency frequently found in oval tracks which support heavy doors.



SIMPLE AND STRONG IN CONSTRUCTION. The form of the Bird Proof track, and the special grade of steel used in its manufacture, combine to give it wonderful strength and rigidity. It is further strengthened by the curved lips on the under side of the track. Will not sag under the weight of heavy doors.

Louden Double-Strap Covered Jointed Barn Door Hanger

The Loudon Double Strap Barn Door Hanger is giving complete satisfaction in thousands of barns. It is especially recommended for medium size doors.

This hanger, like all others of Loudon manufacture, is flexible; that is, it allows the door to swing freely away from the building. (See Fig. 483.)

The trolleys are fitted with tempered steel roller bearings; always roll smoothly and easily. Each wheel is protected by a malleable iron hood. (See Fig. 566.)

The two straps with four bolts make the Double Strap Hanger much stronger and more durable than similar hangers having but a single strap and two bolts. The wide frame with the double strap feature also serves to hold the hanger rigid lengthwise of the track and eliminates the end play found in hangers with a single bearing directly under the center of the wheel.

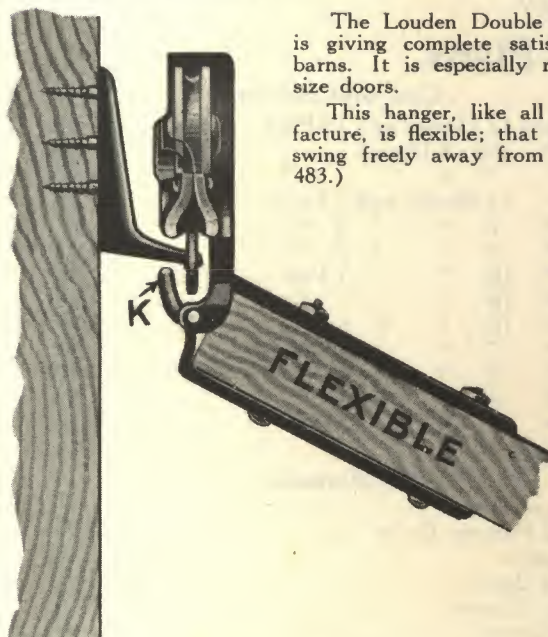


Fig. 483.

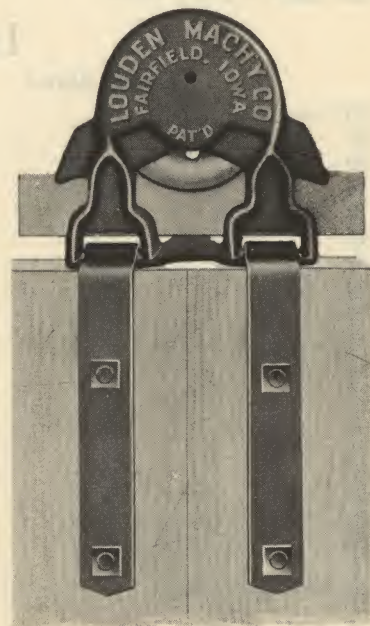


Fig. 566.

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INFORMATION BLANK

for

THE LOUDEN MACHINERY COMPANY

1047 - 1053 Broadway

ALBANY, N. Y.

This form is for your convenience in telling us your barn needs. Filling in this blank does not oblige you in any way, but enables us to write you more intelligently. The sketch on the other side is important and please give the inside measurements.

Will you build or remodel?..... When?.....

How many cows have you to house?..... How many stalls needed?.....

How many horses?..... Calves?..... Bulls?.....

Will you use a harness room?..... Feed bins in barn?.....

Do you expect to use a Manure Carrier?..... Feed Carrier?.....

Manger Divisions?..... Water Bowls?.....

How far from the barn will you dump the manure?.....

Direction of house from barn?.....

Are you interested in complete ventilation?.....

Remarks:

Name Post Office

R. F. D. State

Width Inside..... Feet

Feet

Length Inside.....

Thickness.....

Material in Wall.....

Indicate Location of Girders, Posts and Doors

